

ROAD AND SUBDIVISION



POLICY

**RANDALL COUNTY, TEXAS
2005**

THE FOLLOWING NOTICE WAS GIVEN THROUGH THE CANYON NEWS AND THE AMARILLO GLOBE-NEWS CONCURRENTLY WITH THE MOST RECENT AMENDMENTS, SUPPLEMENTATION AND PUBLICATION OF THE FOREGOING PROVISIONS OF THE RANDALL COUNTY SUB-DIVISION AND ROAD POLICY, TO-WIT:

"NOTICE IS HEREBY GIVEN THAT THE RANDALL COUNTY SUBDIVISION AND ROAD POLICY HAS BEEN AMENDED, AND ALL AMENDMENTS THERETO TO AND INCLUDING JANUARY 6, 1986 ARE AVAILABLE FOR READING IN THE OFFICE OF THE COUNTY JUDGE OF RANDALL COUNTY, IN CANYON, TEXAS, AT THE RANDALL COUNTY COURT HOUSE. ANYONE WISHING TO DO SO MAY INSPECT THOSE AMENDMENTS AND THEREAFTER APPEAR BEFORE THE RANDALL COUNTY COMMISSIONERS COURT, IN ORDER TO QUESTION OR OBJECT TO ANY PROVISION THEREOF. IF NO OBJECTIONS OR QUESTIONS ARE PRESENTED TO THE COURT PRIOR TO FEBRUARY 3, 1986 NONE WILL BE SUBJECT TO LATER CONSIDERATION.

Randall County
Commissioners Court

by Charles M. Small
Randall County Judge

ORDER OF THE RANDALL COUNTY COMMISSIONERS

COURT ESTABLISHING REGULATIONS FOR THE

PLATTING AND RECORDING OF RURAL SUBDIVISIONS

AND DRAINAGE, AND ROAD AND STREET

CONSTRUCTION AND MAINTENANCE

INCLUDING AMENDMENTS AND SUPPLEMENTS ADDED BY THE COMMISSIONERS
COURT OF RANDALL COUNTY, TEXAS THROUGH 1986. '

INDEX

PAGE

(a) ADDITION, PRIVATE ROADS, 6/13/00	A
(b) ADDITION, UPGRADE, USERS EXPENSE 2/27/01	B
(c) ADDITION, 911, 3/20/01	C
(d) ADDITION, LOTS LESS THAN 165 FRONT FOOTAGE 12/18/01	D
(e) ADDITION, HB MANDATED INTERLOCAL AGREEMENT TO PROVIDE FOR THE REGULATION OF SUBDIVISION PLATS AND APPROVAL OF RELATED PERMITS IN THE CITY OF AMARILLO E.T.J..	E
(f) ADDITION, REQUIRED FOR NEW PAVED SURFACES 10/28/03	F
(g) ADDITION, PLATTING AND FILING 8/20/04	G
RESOLUTION NO. 81-85	1
SECTION I – PLATTING & RECORDING OF RURAL SUBDIVISIONS	2
PART A – GENERAL PROVISIONS	2, 3
PART B – PLATTING & FILING	3 thru 7
SECTION II – DRAINAGE OF RURAL SUBDIVISIONS	7
PART A – DRAINAGE STUDY	7
PART B – RUNOFF	7 & 8
PART C – DRAINAGE DITCHES	8 & 9
PART D – FLOODPLAIN PERMITS	9
SECTION III – ROAD & STREET CONSTRUCTION IN SUBDIVISIONS	9
PART A – GENERAL PROVISIONS	9 & 10
PART B – ROAD & STREET DESIGN STANDARDS IN SUBDIVISIONS	10 & 11
SECTION IV – BONDS FOR CONSTRUCTION AND MAINTENANCE	12
PART A – CONSTRUCTION BONDS	12, 13, 14
PART B – MAINTENANCE BONDS	14, 15
SECTION V – MAINTENANCE OF STREETS & ROADS	15
PART A – PIT RUN CALICHE	15, 16
PART B – SEALING PIT RUN CALICHE	16
CONCLUDING SPECIAL PROVISIONS	16 thru 19
SECTION VI – SPECIFICATIONS FOR CONSTRUCTION OF STREETS AND ROADS IN RURAL SUBDIVISIONS	20
TESTING REQUIREMENTS	20
TESTING REQUIREMENTS	20
GENERAL MINIMUM REQUIREMENTS	20
CONCRETE CURB & GUTTER AND VALLEYS	20, 21, 22
GRADING	22, 23
LIME TREATMENT SUBGRADE	24 thru 28
FLEXIBLE BASE	28, 29, 30
PRIME	30, 31, 32

INDEX

	<u>PAGE</u>
SECTION VI – (con't)	
TWO COURSE SURFACE TREATMENT	32 thru 35
HOT MIX ASPHALTIC CONCRETE	35 thru 46
CONCRETE PAVING, RIP RAP, ETC.	46 thru 56
SECTION VII – ESTIMATING STORM RUNOFF	57
GENERAL	57 thru 61
STORM SEWER PIPE CAPACITY	62, 63
INLET CAPACITY	64
FLOW IN TRAPEZOIDAL CHANNELS	65
SOLVING TIME OF CONCENTRATION FOR STORM SEWER DESIGN	66, 67
SECTION VIII – EXHIBITS	
SPECIFICATIONS FOR PRIVATE DRIVEWAYS	68
TYPICAL PAVING SECTIONS	69, 70, 71
STANDARD CUL-DE-SAC	72
CURB & GUTTER DETAIL	73
TYPICAL INTERSECTION DESIGNS	74, 75
HORIZONTAL ALINEMENT & CURVATURE	76
LANE WIDTH VS ACCIDENT RATE GRAPH	77
DRAINAGE DIP DESIGN FOR RIDING	78
RESOLUTION NO. 81-79	79, 80, 81

Addition to Randall County Road Policy - June 13, 2000

Roads within gated subdivisions are not to be constructed, owned, maintained or repaired by Randall County. This rule applies to gated subdivisions both within and outside of municipalities. This rule also applies to municipalities that are entirely gated. This rule applies even in situations where Randall County would be reimbursed for its work.

Additionally, private roads of any kind are not to be constructed, owned, maintained or repaired by Randall County. This rule applies even in situations where Randall County would be reimbursed for its work.

Randall County may construct, maintain or repair roads within municipalities where the County is reimbursed for its work and where those roads are owned by the municipality. However, Randall County may not construct, maintain or repair roads within municipalities where the roads are owned by an entity other than the municipality -- even if those roads are accessible to the general public and the County is reimbursed for its work.

These policies are mandated by Article III, Section 52 of the Texas Constitution which prohibits political subdivisions of the state from lending their credit or granting public money to individuals or private commercial enterprises. These policies are also mandated by Article V, Section 18 of the Texas Constitution which authorizes county commissioners to exercise power only over county business. Additionally, several Texas Attorney General opinions conclude that counties may not repair or maintain private roads. See Op. Tex. Att'y Gen. No's JC-172 (2000); DM-13 (1991); and JM-334 (1985).



Ted Wood
Randall County Judge

Bob Karrh
Commissioner, Prct. 1

Gene Parker
Commissioner, Prct. 2

George "Skip" Huskey
Commissioner, Prct. 3

Craig Gualtiere
Commissioner, Prct. 4



PROPOSED ADDENDUM TO THE RANDALL COUNTY ROAD AND
SUBDIVISION POLICY

Residents of Randall County may up-grade a county maintained road at their expense, under the following conditions:

1. The work must be performed by reputable, insured contractor who will be required to provide to the County proof of liability insurance.
2. All materials used must be pre-approved by the County Road Department.
3. A plan for the control and safe handling of traffic, and the traffic control devices must be pre-approved by the County Road Department.
4. All work and materials must conform to the Randall County Road and Sub-Division Policy specifications.
5. Any additional culverts, or other drainage devices required by this work will be at the expense of the residents.
6. The fact that residents pay for the up-grade does not alter the fact that the road remains under the ownership, control and maintenance of Randall County.

ADOPTED BY RANDALL COUNTY COMMISSIONERS COURT
FEBRUARY 27, 2001.

**AMMENDMENT TO THE RANDALL COUNTY
ROAD AND SUB-DIVISION POLICY**

Randall County Commissioners Court ammended the Road & Sub-division Policy to include the requirement that all plats be approved by signature of the 9-1-1 Director prior to being submitted to Randall County Commissioners Court for approval.

This action taken at the regular Randall County Commissioners Court meeting on March 20, 2001.

AMMENDMENT TO THE RANDALL COUNTY ROAD AND SUB-DIVISION POLICY

Randall County Commissioners Court ammended the Road & Sub-Division Policy by deleting Paragraph 3, Page 11, and adding the following:

Concrete, dip type, entryways shall be required to be constructed on all streets where lots are less than 165 feet in width, with such width to be measured along the right-of-way and shall be the part fronting on the street rather than on a side street. Specifications for concrete entryways are found elsewhere in this policy document. Where drainage concerns require ditches to be deeper than 15" (fifteen inches) as measured at the deepest point along a straight line from the edge of the pavement to the property line, concrete or steel culverts may be used for entryways. If culverts are indicated by construction plans then a common culvert for each two lots will be required so as to maintain the maximum distance between culverts to facilitate maintenance. Culvert placement shall be shown on the plat. No final approval will be given on street construction until all entryways are installed.

This action taken at the regular Randall County Commissioners Court meeting on December 18, 2001.



CITY OF AMARILLO

PLANNING DEPARTMENT

April 5, 2002

TO: TO WHOM IT MAY CONCERN
FROM: AMARILLO PLANNING DEPARTMENT
SUBJECT: APPROVAL OF SUBDIVISION PLATTING IN THE EXTRATERRITORIAL JURISDICTION (5 MILE RADIUS OF AMARILLO)

The Texas Legislature passed HB 1445, stating that a city and county may not both regulate subdivisions in the extraterritorial jurisdiction (ETJ). Cities and counties must therefore reach an agreement identifying which entity is authorized to regulate subdivision plats and approve related permits in the ETJ. The agreement may grant authority to the city or county, or it may divide the ETJ into areas regulated by the city and areas regulated by the county. The surrounding counties agreed to have the City of Amarillo regulate development in the ETJ.

The agreements with the City Of Amarillo and Potter, Randall, Carson and Armstrong counties require the following:

1. The City of Amarillo will be the only governmental unit to review and approve plats in the ETJ.
2. The counties will utilize all the City requirements for subdivision plats, drainage and construction standards in the ETJ.
3. The term of review is annually if changes have been made in City subdivision requirements.
4. All plats will be sent to the City and reviewed and approved by the Planning and Zoning Commission.
5. Several exemptions to the platting requirements are provided for in the various state laws. The City will use the exemptions for both the City and counties to determine who is required to plat.
6. The City has put together a list of requirements for the subdivision of land in the ETJ.
7. All improvements to subdivisions in the ETJ will meet all the requirements of the City. Review of plans, including drainage, will be by the City Engineering Department. Construction of all improvements will be inspected by the City.

(1) E

Copies of the agreements are being sent to:

Armstrong County Clerk
Armstrong County Road Dept.
Armstrong County Sheriff
Armstrong County Tax
Armstrong County Judge
Carson County Clerk
Carson County Road Dept.
Carson County Sheriff
Carson County Tax
Carson County Judge
Cablevision
Chief Appraiser
Code
Emergency Mgt.
Energas
Engineering
Environmental Health
FEMA (Diane Leatherwood)
Fire Chief/Prevention
Legal
Library
Parks
Planning Technician
Police Chief
Police Dept. Stats & Records

Potter County Clerk
Potter County Road Dept.
Potter County Sheriff
Potter County Tax
Potter County Judge
Potter-Randall 911
Public Works
Randall County Clerk
Randall County Road Dept.
Randall County Sheriff
Randall County Tax
Randall County Judge
SPS
SWBT
Solid Waste Collection
Street Dept.
TNRCC
Texas Alcohol Beverage Commission
Texas Dept. of Highways
Traffic Engineering
USP
Utilities
Abstractors/Surveyors (16)

For additional information on this matter or the platting process, please contact:

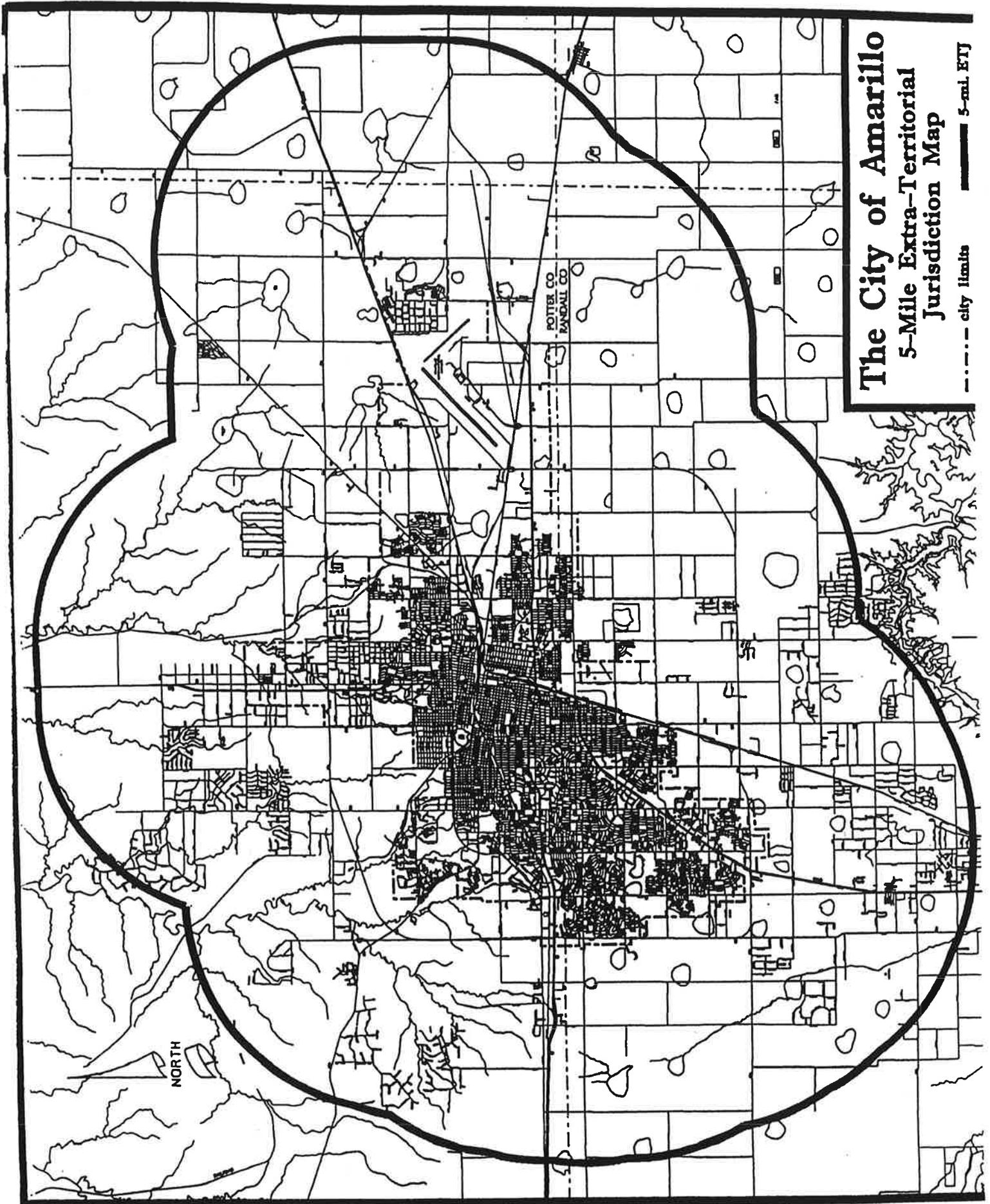
Tom Horton
Senior Planner
Amarillo Planning Dept.
P.O. Box 1971
Amarillo, Texas 79105
806-378-4223
Fax No. 806-378-9388
tom.horton@ci.amarillo.tx.us

J D Smith Jr.
Director of Community Services
City Of Amarillo
P.O. Box 1971
Amarillo, Texas 79105
806-378-4222
Fax No. 806-378-9388
jd.smith@ci.amarillo.tx.us

Sincerely,



Tom Horton
Senior Planner



The City of Amarillo

5-Mile Extra-Territorial Jurisdiction Map

5-mi. ETJ

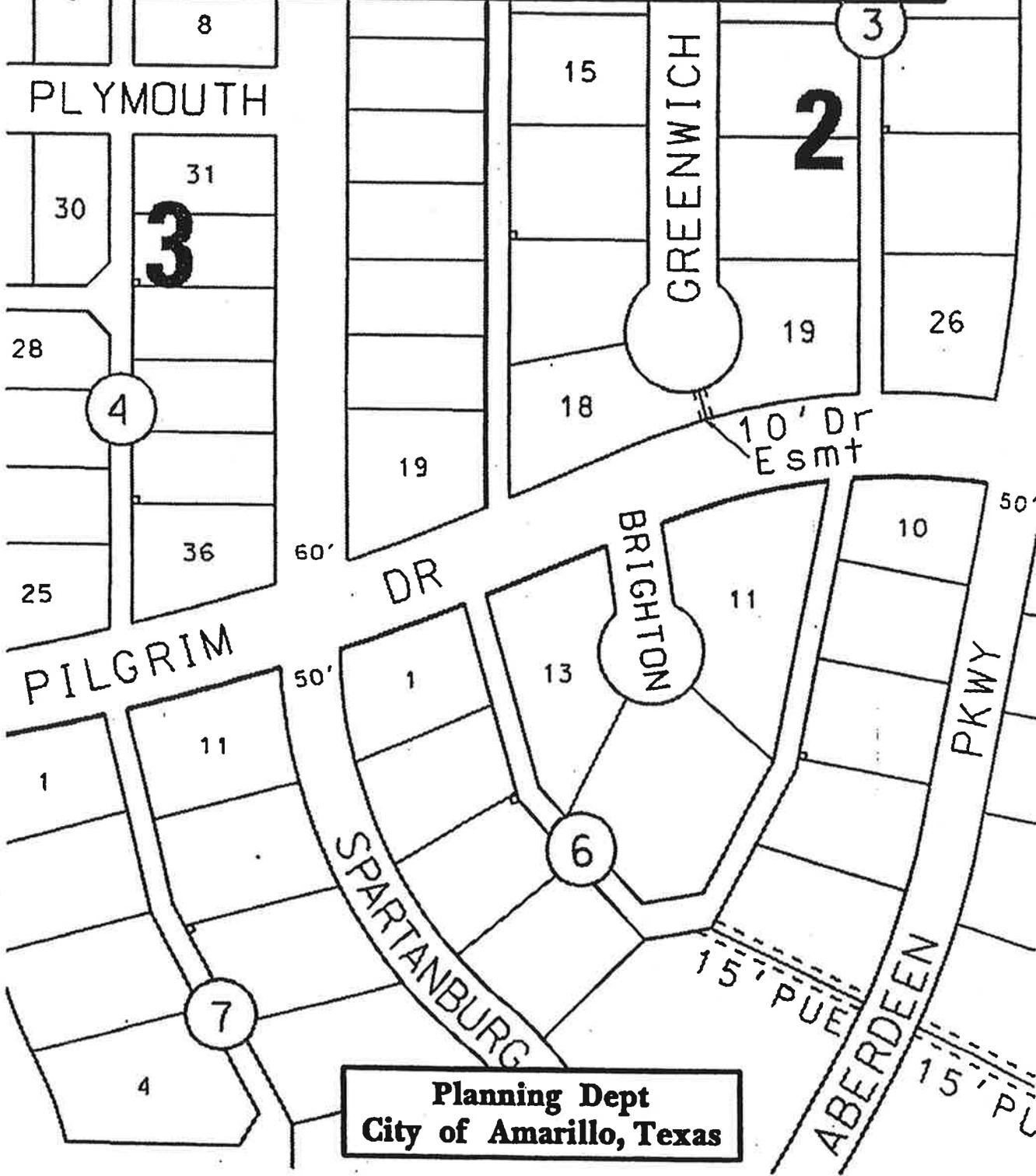
city limits

NORFOLK

PL

3

BASIC INFORMATION ABOUT PLATTING



Planning Dept
City of Amarillo, Texas



RANDALL COUNTY TEXAS

ROAD DEPARTMENT
301 W Highway 60, Canyon, Texas 79015

(806) 655-3861 Fax: (806) 655-0397
e-mail: roadandbridge@randallcounty.org

A PLAT (OUTSIDE THE CITY OF AMARILLO E.T.J.) SUBMITTED TO THE RANDALL COUNTY COMMISSIONERS COURT FOR APPROVAL

THE PLAT SUBMITTED MUST BE THE ORIGINAL DRAWN ON (4 MIL) MYLAR WITH PERMANENT BLACK INK. THE EXACT SIZE SHALL BE 18 INCHES BY 24 INCHES AND SHOULD BE DRAWN TO A SCALE OF 100 FEET TO THE INCH. AND WHERE THE AREA BEING SUBDIVIDED WILL NOT FIT IN THE AFORESAID DIMENSIONS, TWO OR MORE SHEETS SHALL BE USED. IF TWO OR MORE SHEETS ARE USED, A KEY MAP SHOWING THE ENTIRE AREA SHALL BE DRAWN ON THE FIRST SHEET OR ON A SEPARATE SHEET.

MUST HAVE THE FOLLOWING ATTACHMENTS:
(PER SECTION 12.002 OF THE PROPERTY CODE)

1. EXACT DUPLICATE ON 8½ INCHES BY 14 INCHES ON MYLAR
2. IF THE PLAT HAS STREETS:
 - CONSTRUCTION PLANS
 - CONSTRUCTION BOND
3. DRAINAGE REPORT
4. ORIGINAL TAX CERTIFICATE
5. GROUND WATER CERTIFICATE
6. SIGNATURES OF APPROVAL FROM:
 - BI-CITY COUNTY HEALTH DEPARTMENT (806)378-9472
 - 911 EMERGENCY DISTRICT (806)374-9800

PLATS WITHIN THE CITY OF AMARILLO E.T.J. DO NOT GO THRU RANDALL COUNTY COMMISSIONERS COURT.

PLATS ARE NOT PLACED ON THE AGENDA UNTIL ABOVE CONDITIONS ARE MET.

TO ENSURE PLACEMENT ON THE NEXT COMMISSIONERS COURT, ALL DOCUMENTATION MUST BE SUBMITTED TO THE ROAD SUPERINTENDENT BY 5:00pm ON THE TUESDAY PRIOR.

THANK YOU FOR YOUR COOPERATION.


ROAD SUPERINTENDENT

PLATTING PROPERTY

WHAT is a plat?

A plat is a scaled drawing prepared by a land surveyor showing the location and boundaries of individual tracts to be developed. The plat must comply with local platting and subdivision regulations that are adopted in accordance with State law. The plat must also comply with the general rules and procedures and practices of the Texas Board of Professional Land Surveyors. After review by various departments and local utility companies and after all necessary changes are made to the plat by the land surveyor, the plat is considered for final approval by the Planning and Zoning Commission. The plat is then officially recorded in the deed records of the county in which the platted property is located.

WHY is platting necessary?

The purpose of platting is to meet local and State law requirements designed to promote orderly and systematic growth in and around the City. The platting process ensures that a project is on a legally subdivided lot with proper space for development and with the required utility easements, roadways, and public facilities.

WHEN is a plat required?

A plat is required when land is divided for the purpose of sale or transfer of ownership, or when creating a new building site prior to issuance of a building permit inside the city limits. A plat is also required to attain connections to a public utility, such as electricity, in an area extending 5 miles beyond the current City limits, known as extraterritorial jurisdiction (ETJ). The ETJ is identified on an official map kept on file in the City Planning Department. Platting is required unless an exception is authorized by the City's platting and subdivision ordinance or by State laws that govern platting.

WHERE is a plat required?

A plat is required on any tract to be developed within the corporate limits of the City of Amarillo, or on any tract in the City's ETJ that is 5 acres or less in size and is not subject to ETJ platting exceptions set forth in State law as described later in this publication.

HOW to plat property:

A plat must be submitted by a registered professional land surveyor or licensed state land surveyor authorized to practice in Texas. When a site is subject to platting, it is recommended that the developer contract with a land surveyor familiar with Amarillo's platting and subdivision ordinance and the City's plat review process. The surveyor will prepare a plat and submit it to the Planning Department for processing. For land that has never been platted before or land to be replatted, plans prepared by a Texas licensed professional engineer for water, wastewater, drainage, and paving plans are required to be approved by the City Engineering Department and Utilities Division prior to plat approval by the Planning and Zoning Commission.

Once a plat is submitted to the Planning Department, copies of it are forwarded to other City departments and local utility companies for review to assure that all necessary easements, right-of-way, and improvements are provided. The Planning Department mails public notices to specified surrounding property owners when the property being replatted is residential or is limited to residential use. The plat is then submitted to the Planning and Zoning Commission for consideration and, when approved, the plat is filed of record at the County in which the property is located. The time period involved for plat review is approximately 21 to 28 days if the plat is in order and any necessary engineering plans are promptly submitted.

Platting in the Extraterritorial Jurisdiction:

The City of Amarillo and the counties in which Amarillo's ETJ is located (Armstrong, Carson, Potter, and Randall Counties) have official agreements that the City of Amarillo will oversee platting in Amarillo's ETJ. The City has the exclusive authority to approve or deny plats and required plans for streets, alleys, and storm water drainage facilities in the ETJ, in accordance with City regulations. Streets, alleys or storm water drainage facilities in the ETJ must meet City design and construction standards.

There are several exceptions where a plat is not required within the ETJ. The exceptions are primarily county requirements set forth in State law that are honored by the City of Amarillo when enforcing platting laws in its ETJ. The exceptions are:

- (EXCEPTIONS TO PLATTING IN L10, CONTINUED)*
1. Division of land owned by the State, State agency, board, commission or owned by the permanent school fund or any other dedicated funds of the State UNLESS the owner lays out streets, alleys, squares, parks, or other parts of the tract intended to be dedicated to public use or for the use of purchasers or owners of lots fronting on or adjacent to the streets, alleys, squares, parks, or other parts.
 2. Division of land into four or fewer parts AND is to be transferred to a relative of the owner related within the third degree by blood or marriage.
 3. Division of land into two or more parts if:
 - a. The owner is a political subdivision of the State, the land is situated in a floodplain, AND the lots are sold to adjoining landowners.
 - b. The owner does not lay out streets, alleys, squares, parks, or other parts of the tract intended to be dedicated to public use or for the use of purchasers or owners of lots fronting on or adjacent to the streets, alleys, squares, parks, or other parts, AND meets at least one of the following provisions:
 - (1) All the lots are greater than 5 acres in size. (Note: Amarillo acknowledges the City exception of "greater than 5 acres" because it is less restrictive than the counties' "10 or more acres" exemption)
 - (2) All the lots are sold to veterans through the Veterans' Land Board program.
 - (3) One new part is to be retained by the owner, and the other new part is to be transferred to another person who will further subdivide the tract subject to plat approval requirements.
 - (4) All parts are transferred to persons who owned an undivided interest in the original tract and a plat is filed before any further development of any part of the tract.

Public Improvement Plans:

When the plat is submitted to the Planning Department for processing, the developer must arrange for drainage and paving plans to be submitted for review and approval to City Engineering Department, and water and wastewater plans are to be submitted to the Utilities Division. For those plats located in the ETJ, the Engineering Dept. will forward a copy of the drainage and paving plans to the appropriate county road superintendent for review and comment. All engineered plans shall meet City standards.

Once the plans are approved as described and the plat meets all City ordinances and State law requirements, the plat will be approved by the Amarillo Planning and Zoning Commission. An agreement between the developer and the City will be executed that provides the public improvements at the developer's expense. During construction, the City Engineering Department will make inspections. After construction is completed and final inspections are made by the City Engineering Department, maintenance of the public facilities (i.e. street paving) will become the responsibility of the county in which the property is located. One year maintenance bonds are required for the public improvements after final acceptance.

For additional details, contact:

Platting requirements:

(Physical Address)

Planning Department
Room 206, City Hall
509 E 7th Avenue
Amarillo, TX 79101

(Mailing Address)

Planning Department
P O Box 1971
Amarillo, TX 79105-1971
Phone: 806-378-4223

Drainage and paving improvement plans requirements:

(Physical Address)

Engineering Department
Room 209, City Hall
509 E. 7th Avenue
Amarillo, TX 79101

(Mailing Address)

Engineering Department
P O Box 1971
Amarillo, TX 79105-1971
Phone: 806-378-4227

Water and wastewater improvement plans requirements:

(Physical Address)

Utilities Division
Room 101, City Hall
509 E. 7th Avenue
Amarillo, TX 79101

(Mailing Address)

Utilities Division
P O Box 1971
Amarillo, TX 79105-1971
Phone: 806-378-4266

CRESTWAY ADDITION UNIT NO. 3

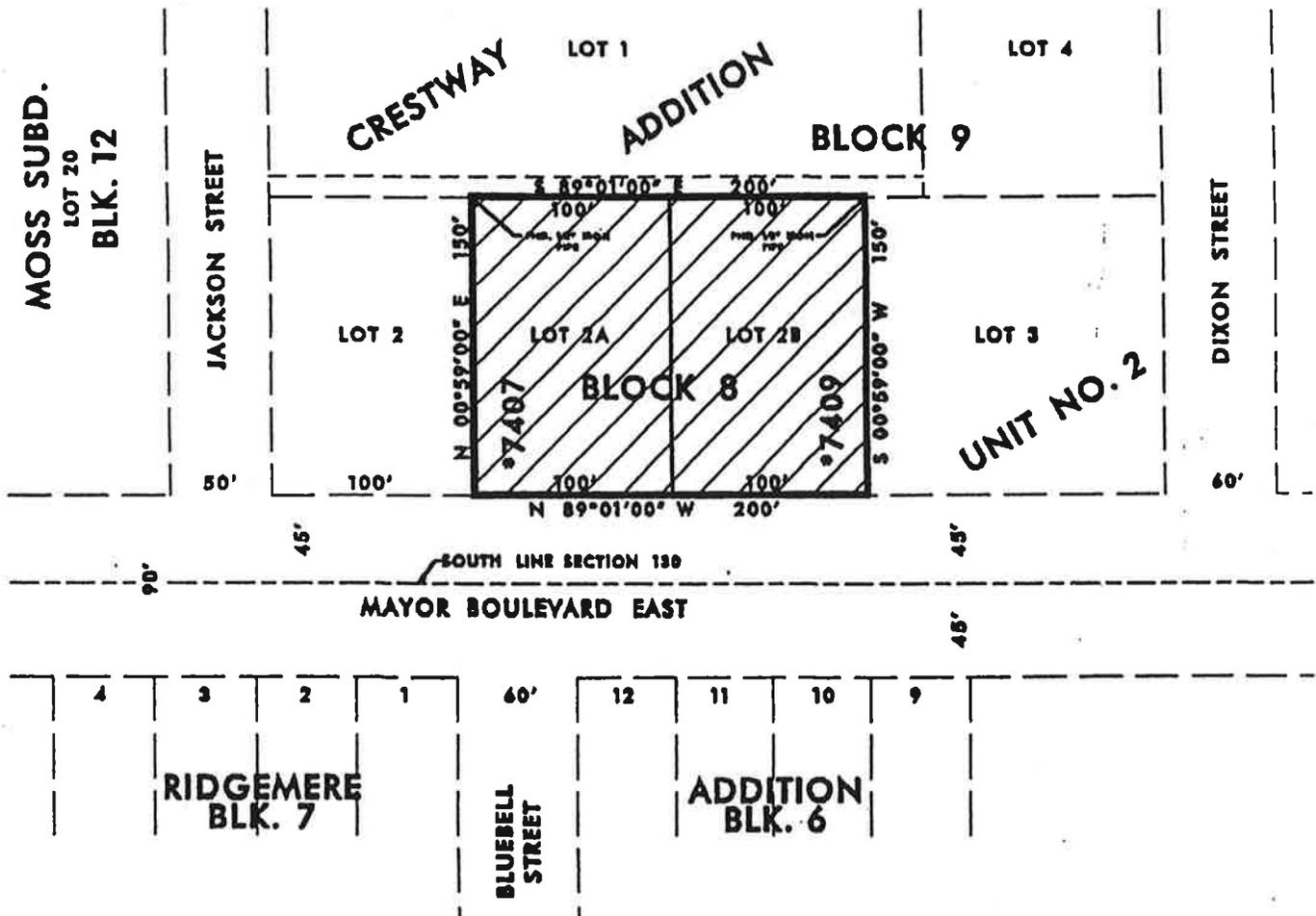
AN ADDITION TO THE CITY OF AMARILLO,
POTTER COUNTY, TEXAS

BEING A REPEAT OF A PORTION OF LOT 2, BLOCK 8, CRESTWAY ADDITION, UNIT NO. 2,
OUT OF SECTION 130, BLOCK 2, A.B. & M. SURVEY

EXAMPLE



0.6887 ACRE



***7407: ADDRESS (Subject to Change Without Notice)**

**Note: This plat is not within
the Amarillo E.T.J.**

DEDICATION:

THE STATE OF TEXAS X
 X KNOW ALL MEN BY THESE PRESENTS
COUNTY OF POTTER X

That I, _____, being the owner of the land shown and described on this plat, have caused all of said lands to be surveyed, subdivided, platted and designated as Crowthay addition, Unit no. 3, an addition to the City of Amarillo, Texas; and I do declare that all of the streets, alleys, lanes, and easements shown upon such plat and map are dedicated, and same are hereby dedicated, to the public forever, to be used as streets, alleys, lanes, and easements.

EXECUTED this _____ day of _____, 200_

ATTEST:

THE STATE OF TEXAS X
 X
COUNTY OF POTTER X

BEFORE ME, the undersigned authority in and for said County, Texas, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this _____ day of _____, A.D. 200_



Notary Public, Potter County,
Texas

CERTIFICATE:

I, _____, a Registered Professional Land Surveyor, in the State of Texas, do hereby certify that this plat is true and correct as surveyed and staked on the ground by me from a perimeter survey on this _____ day of _____, 200_.



R.P.L.S.
Reg. No. XXXX
Amarillo, Texas

APPROVAL:

Approved by the City Planning and Zoning Commission of Amarillo, Texas, dated this _____ day of _____, 200_.

Chairman

INTERLOCAL AGREEMENT

This Agreement (the "Agreement") is entered into by and between the City of Amarillo, Texas ("CITY") and Randall County, Texas ("COUNTY").

WHEREAS, pursuant to Texas Government Code, Chapter 791, "Interlocal Cooperative Contracts," the CITY and COUNTY are authorized to enter into agreements with one another to increase the efficiency and effectiveness of local governments; and

WHEREAS, HB 1445 mandates that CITY and COUNTY develop a written agreement to provide for the regulation of subdivision plats and approval of related permits in CITY's extraterritorial jurisdiction ("ETJ"); and

WHEREAS, CITY and COUNTY have agreed that the CITY platting and infrastructure requirements are more stringent than the COUNTY requirements in the ETJ; and

WHEREAS, CITY and COUNTY have agreed that because the CITY has resources in place to review plats and approve permits and COUNTY has few such resources, that CITY shall have exclusive authority to regulate subdivision plats and approve related permits in the ETJ;

NOW, THEREFORE, in consideration of the foregoing and the mutual promises and covenants contained in this Agreement, CITY and COUNTY agree as follows:

ARTICLE I.

PURPOSE AND SCOPE OF AGREEMENT

CITY is hereby granted exclusive authority to approve or disapprove plats and required plans for transportation and storm water drainage infrastructure and any related permits pertaining to its ETJ, in accordance with the CITY ordinances. All services shall be provided at CITY'S offices. To the extent allowed by law, CITY shall exclusively exercise all relevant authority granted to COUNTY with respect to plat and subdivision regulations. Accordingly CITY shall have the

exclusive authority to inspect and approve construction of transportation and storm water drainage infrastructure within the ETJ. The CITY's ordinances pertinent to subdivisions, including but not limited to plats, subdivision development ordinances and regulations, flood mitigation regulations, and related permitting requirements, are hereby adopted by the parties to control in the ETJ.

ARTICLE II.

PUBLIC IMPROVEMENTS

Any platting or public improvements of streets, alleys or storm water drainage facilities must meet the CITY design and construction standards. All construction must be done in accordance with the requirements and standards of the CITY, as provided by the municipal code and any other applicable laws or regulations.

ARTICLE III

TERM AND TERMINATION

This Agreement shall commence upon execution of this Agreement as shown below. In the event Texas Government Code Section 791.011(f) requires an annual renewal of this Agreement, the parties shall be deemed to have elected to renew the Agreement annually on the anniversary of the Agreement. Either party may terminate this Agreement upon thirty days advance written notice to the other party.

ARTICLE IV.

COST AND PAYMENT

A. COUNTY agrees that CITY shall be entitled to all fees related to platting related permits and infrastructure construction services to be provided in the ETJ. Such fees shall be as defined in the Amarillo Municipal Code.

- B. CITY is not obligated to share any of the fees with COUNTY.
- C. CITY agrees that fees shall fairly compensate CITY for the services performed under this Agreement.

ARTICLE V.

MANAGEMENT

- A. CITY's contact for matters relating to the services performed under this Agreement is:

Director of Community Services
City of Amarillo Planning Department
P. O. Box 1971
Amarillo TX 79105-1971
(806) 378-4222
(806) 378-9388 fax
jd.smith@ci.amarillo.tx.us

B. CITY will permit COUNTY to confer as necessary with CITY regarding platting in the ETJ. The County Judge will be sent a copy of each submitted plat within the ETJ for the COUNTY to review. The COUNTY shall have ten (10) calendar days from the date of receipt of each such plat within which to make comments to CITY. The COUNTY's comments will be incorporated into a report on the plat submitted to the Amarillo Planning and Zoning Commission for consideration prior to the public hearing on the plat. If no comments are received, the COUNTY will be deemed to have no comments.

C. CITY will permit the COUNTY to confer as necessary with the CITY regarding transportation and storm water drainage infrastructure construction regulations, flood mitigation regulations and related permits in the ETJ.

ARTICLE VI.
CONFIDENTIALITY

It is contemplated that the services to be performed under this Agreement can be carried out without disclosing any of CITY's confidential information to COUNTY. However, should it become necessary for CITY to disclose its confidential information to COUNTY, COUNTY agrees to maintain the confidential information in confidence, and shall not disclose the confidential information to any third party without CITY's approval.

ARTICLE VII.
REPORTING REQUIREMENTS

CITY shall submit to COUNTY any reports/maps prepared by CITY in the regular course of business which relate to the platting and public improvements in the ETJ.

ARTICLE VIII
EXPANSION/REDUCTION

The CITY shall notify COUNTY in writing of any changes in the ETJ, expanding the ETJ or reducing the ETJ. Any changes in ETJ shall not act to alter the effectiveness of any plat previously approved as provided by Chapter 245, Local Government Code. The parties agree that all terms of this Agreement will automatically apply to any reduction or expansion of the ETJ.

ARTICLE IX.
STATUTORY EXCEPTIONS TO PLATTING IN THE ETJ

A. The parties hereby agree that all exceptions to platting as set forth in Chapter 232, Section 232.0015(e)-(k) and Subchapter B of Chapter 232 and Sections 212.004, 212.0046 and Subchapter B of Chapter 212, Local Government Code, shall be allowed in the ETJ.

B. Minor Plats. The Director of Community Services shall have authority to approve minor plats in the ETJ in accordance with Chapter 212, Sections 212.065 and 212.016, Local Government Code.

C. Utility Service. All utility service shall be in compliance with Chapter 212, Section 212.012, Local Government Code.

ARTICLE X.

RECORD RETENTION

Records pertaining to any particular plat shall be maintained, retained, or destroyed by CITY in accordance with CITY's records retention and destruction policies. COUNTY shall have access to and the right to examine, audit and copy such records.

ARTICLE XI.

NOTICES

Whenever any notice is to be given under the terms of this Agreement, it will be in writing and sent to the following addresses:

CITY:

City of Amarillo
Attention: Planning Department
P. O. Box 1971
Amarillo TX 79105-1971

COUNTY:

County of Randall
County Judge Office
400 16th St.
Amarillo TX 79015

Any notice given pursuant to this Agreement shall be effective as of the date of receipt by registered or certified mail and mailed to the address stated in this Agreement.

ARTICLE XII.

GOVERNING LAW

This Agreement will be governed and construed in accordance with the laws of the State of Texas. This Agreement is performable in Potter County, Texas.

ARTICLE XIII.

INTEGRATION CLAUSE

This Agreement contains the entire understanding of the parties as of the date of the final signature below in respect to the subject matter of this Agreement and supersedes all prior written or oral representations, statements, negotiations, or agreements. This Agreement may only be modified by written amendment executed by the authorized representatives of both parties.

ARTICLE XIV.

AUTHORIZED BY GOVERNING BODY

By execution hereof each party warrants it has been authorized to enter into this Agreement by its governing body.

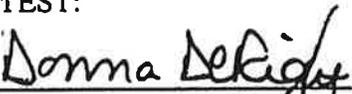
IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by its duly authorized representatives on March 19, 2002.

CITY OF AMARILLO

By


John Q. Ward, City Manager

ATTEST:


Donna DeRight, City Secretary

RANDALL COUNTY


Randall County Judge



RANDALL COUNTY TEXAS

ROAD DEPARTMENT

P.O. Box 1338

Canyon, Texas 79015

(806) 655-3861

Fax: (806) 655-0397

e-mail: roadandbridge@randallcounty.org

October 28, 2003

NOTICE

The Randall County Subdivision and Road Policy has been amended to require, as a minimum, one and one-half inches (1 ½) of asphalt concrete paving (Hot Mix) on all new paved surfaces expected to be maintained by Randall County, and to reduce the bonded maintenance period from two (2) years to one (1) year.

This amendment eliminates the option of a two (2) course surface treatment for paving. (See page 10, Part B, Paragraph 1, Road and Street Design Standards in Subdivisions). All other design standards remain in place.

The Randall County Commissioners court, October 28, 2003, approved this amendment, and the amended policy will be in force on all plats submitted for approval after this date.

Russell Hanson
Randall County Superintendent



RANDALL COUNTY TEXAS

ROAD DEPARTMENT

P.O. Box 1338

Canyon, Texas 79015

(806) 655-3861

Fax: (806) 655-0397

e-mail: roadandbridge@randallcounty.org

August 17, 2004

Addition to the Randall County Road and Subdivision Policy

Addition G

Delete: Paragraph 4, Page 3, under part B – Platting and Filing

Add: (Paragraph 4, Page 3, under part B – Platting and Filing). This plat shall be the original, drawn on 4 mil. Mylar with permanent black ink. The exact size shall be 18 inches by 24 inches and shall be drawn to a scale of 100 feet to the inch, and where the area being subdivided will not fit in the aforesaid dimensions, two or more sheets shall be used. If two or more sheets are used, a key map showing the entire area shall be drawn on the first sheet or on a separate sheet. Attached to the plat (per Section 12.002 of the Property Code) will be an original tax certificate from each taxing unit with jurisdiction of the real property indicating that no delinquent Ad Valorem taxes are owed on the real property. Presented at the time of filing will be the original, with original signatures, an exact duplicate on 8 ½ inches by 14 inches Mylar, and the original tax certificates.

Approved by Randall County Commissioners Court August 20, 2004


Ernie Houdashell, Randall County Judge

RANDALL COUNTY, TEXAS
SUBDIVISION AND ROAD POLICY

REVISIONS AND ADDITIONS, #H

REMOVE PAGE 72 OF THE RANDALL COUNTY SUBDIVISION AND ROAD POLICY, STANDARD CUL-DE-SAC, AND REPLACE WITH REVISED STANDARD CUL-DE-SAC, (EXHIBIT A).

THIS REVISION, (EXHIBIT A), REQUIRES A LARGER R.O.W. RADIUS AND A LARGER PAVED TURNING RADIUS TO FACILITATE THE EASE OF TURNING OF SCHOOL BUSES, FIRE TRUCKS AND OTHER EMERGENCY VEHICLES.

APPROVED BY THE RANDALL COUNTY COMMISSIONERS COURT THIS 12
DAY OF OCTOBER, 2004.


ERNIE HOUDASHELL
RANDALL COUNTY JUDGE



RESOLUTION NUMBER 99-

TO AMEND THE RANDALL COUNTY ROAD AND SUBDIVISION POLICY TO CLARIFY THE LANGUAGE CONCERNING THE POSTING OF CONSTRUCTION BONDS AND UPDATE THE AMOUNT OF BOND REQUIRED

WHEREAS, the language of when the Construction Bond is required to be posted has been mis-interpreted;

AND WHEREAS, the amounts of the Construction Bond requirements are outdated;

NOW, THEREFORE, be it resolved that the Randall County Road and Subdivision Policy be amended as follows:

DELETE PARAGRAPH 2, PAGE 13 OF THE RANDALL COUNTY ROAD AND SUBDIVISION POLICY AND REPLACE WITH THE FOLLOWING:

2. In order to insure that the roads in accepted and approved subdivisions are constructed in accordance with the specifications set forth herein, the owner shall file a Construction Bond, executed by some surety company authorized to do business in this state, which bond shall be payable to the Judge of Randall County or his successors in office. The Construction Bond shall be filed with the County Judge before the subdivision plat is to be considered for approval by the Randall County Commissioners Court, and shall be maintained in full force and effect until all work is completed and accepted by the County, and shall be in an amount to be fixed and determined as follows:

a. Where no drainage structures or other additions are involved:

1. Paved streets with curb-----\$41.00 per lf.
2. Paved streets-----\$22.00 per lf.
3. Each concrete entry-----\$700.00 each

B. Where drainage structures or other construction costs are involved, add estimated cost of additional work to the amount of the bond determined under provisions "a" above.

READ IN OPEN COURT AND PASSED by the Randall County Commissioners Court this 25th day of May, 1999.

Attest:

Randall County Commissioners Court

Sue Bartolino, County Clerk

Ted Wood, County Judge

1981 RESOLUTION NUMBER 81-85

RANDALL COUNTY COMMISSIONERS COURT ORDER FOR THE
ESTABLISHMENT OF REGULATIONS GOVERNING THE PLATTING
AND RECORDING OF RURAL SUBDIVISIONS AND GOVERNING
DRAINAGE AND ROAD AND STREET CONSTRUCTION AND ROAD
AND STREET MAINTENANCE IN SUBDIVISIONS AND OTHER
AREAS OF RURAL RANDALL COUNTY THAT DO NOT FALL IN
SUBDIVISIONS OR INCORPORATED AREAS

BE IT REMEMBERED that on this the 28th day of December, 1981 came on to be considered by the Commissioners Court of Randall County, Texas, a proposal to follow and adopt the provisions of Articles 974a, 6662 and 6662a, of Vernon's Annotated Texas Statutes and all other Statutory provisions of this state that are applicable to the subject of this Resolution and Order of this Court regarding the establishment of regulations governing the platting and recording of rural subdivisions and water drainage and road and street construction and maintenance in subdivisions and other unincorporated areas of this County;

AND THE COURT, having heard all appropriate discussion on said proposal is of the opinion that although in 1974 and subsequent years this Court did enact policies regarding subdivisions, tracts, and road and street construction, now, more definite and certain and extensive regulations are needed in order to accomodate the welfare and best interest of Randall County citizens in the rural areas, to improve streets and roads, and to provide more adequate draining systems, as well as to facilitate the identification of land within subdivisions for purposes of placement on the Randall County tax rolls and on the tax rolls of other taxing entities having jurisdiction over

Randall County property, and to make it less complicated and more convenient for legal descriptions of land to be set forth in conveying and encumbering the same.

FOR THE BENEFIT AND NECESSITIES OF THE PUBLIC, IT IS THEREFORE HEREBY ORDERED AND RESOLVED by the Commissioners Court of Randall County, Texas, on this the 28th day of December, A.D. 1981, that all of the following regulations and policies are established concerning the platting and subdividing of land, the construction and maintenance of streets and roads within subdivisions and other unincorporated areas and the draining of lands necessitated by the construction of streets and roads in Randall County, Texas to-wit:

SECTION I - PLATTING AND RECORDING OF RURAL SUBDIVISIONS

PART A -- GENERAL PROVISIONS

1. As the prerequisite for approval by the Commissioners Court of any tract, parcel or area of land for platting or subdividing, and before any maintenance of any street or road will be assumed, and before approving the dedication or construction of any road the applicable conditions in these policies and regulations shall be first met.
2. All of the provisions of Articles Nos. 974a, 6626, and 6626a of the Revised Civil Statutes of Texas are hereby adopted and made a part of this order and of these regulations, insofar as any of the provisions thereof lend weight or validity to the provisions hereof.
3. Where rural real estate in Randall County is situated within five (5) miles of the corporate limits of any incorporated city, town or village in this County or adjoining it, the governing body of such city, town or village or its planning commission, as the case may be, as provided for in Article 974a, Vernons Texas Civil Statutes, shall perform the duties herein imposed upon the Commissioners Court, provided however, that subject to the express provisions of that statute the Commissioners Court shall be entitled to regulate the size, type, quality and construction of streets and roads therein and the draining and easements provided for therein, and for that purpose to approve or disapprove the same.

4. A pre-plan conference with the Randall County Road Superintendent shall be obtained and carried out prior to the submission of any proposed subdivision plat to the Randall County Commissioners Court. The plat shall be delivered in duplicate to the Road Superintendent and to the District Attorney's Office. Such a conference shall take place no less than ten days prior to the exhibition or any proposed Subdivision Plat to the Commissioners Court in order to allow the proposed plat with a legal advisor of the county prior to presentation to the Court. The purpose of this requirement is to expedite and clarify the requirements herein made.
5. Persons, firms or corporations intending to sell tracts of land or to plat or subdivide any land in Randall County are hereby made aware that any and all provisions hereof are fully enforceable under the constitution and statutes of this state as shown by the discussions and conclusions and rulings of Attorney General of Texas Opinions Nos. H-904 signed by John N. Hill, Attorney General Of Texas on September 20, 1977, interpreting the statutes herein cited.

PART B -- PLATTING AND FILING

1. On all plats and subdivisions submitted for approval and filing in Randall County, the following regulations are hereby made;
2. A map shall be submitted, on a scale of not more than two hundred (200) feet per inch, and certified to as to accuracy by the Engineer or Surveyor preparing the plat of the new subdivision, showing in reasonable detail the location and width of existing and dedicated streets, lots and alleys, and similar facts regarding all property immediately adjacent thereto; also, the connections between the new and old subdivisions. Tentative approval must be obtained for this map from the Commissioners Court, before any street work is started in the subdivision.
3. A final plat must be approved by the Commissioners Court prior to its submission to the County Clerk for recording.
4. This plat shall be drawn with India Ink on tracing cloth consisting of one or more sheets measuring 18 inches wide and 24 inches long in size, with 2 1/2 inch binding margin on the left of said sheet, and an appropriate margin on each of the other three sides; shall be drawn to a scale of 100 feet to the inch, and where the area being subdivided will not fit in the aforesaid dimensions, two or more sheets shall be used. If two or more sheets are used, a key map showing the entire area shall be drawn on the first sheet, or on a separate sheet.

5. The name of the proposed subdivision, or any of the physical features, (such as streets, parks, etc.) must not be so similar in spelling or in pronunciation to the names of any similar features in Randall County, or in any incorporated town or city therein, as to cause confusion. All streets shall be named. Streets which are a continuation of any existing street shall take the name of the existing street.
6. The subdivision plat must be made from an actual survey on the ground by or under the supervision of either a registered professional engineer or registered public surveyor, and his certificate to that effect must appear on said plat. The plat must be certified to by a registered professional engineer that proper engineering consideration has been given to this plat to the matters of streets, lots and drainage layouts.
7. Boundary lines must be shown by bearings and distances, calling for the lines of established surveys, land marks, school districts and other data furnished, sufficient to locate the property on the ground. All block corners and angles in streets and alleys shall be marked with a 3/4 inch galvanized pipe 2 feet long, or with an appropriate concrete marker.
8. Unconventional layouts, or layouts that will cause unsatisfactory drainage conditions, or that will complicate maintenance of streets or any land dedicated for public use, will not be accepted.
9. Lot and block numbers are to be arranged in a systematic order and shown on the plat in distinct and legible figures. The length of blocks shall not exceed a maximum of approximately 1,800 feet.
10. Locations of lots, streets, alleys, parks, easements and other features must be shown with accurate dimensions in feet and decimals of feet. Length of radiuses and arcs of all curves with bearings of all tangents, must be shown, also dimensions from all angle points and points of curve to lot lines.
11. A certificate of dedication, duly acknowledged, of all streets, alleys, parks, playgrounds and other land intended for public use shall be a part of the plat. The dedication must be absolute.
12. The plat shall show all natural drains and water courses as they exist on the ground, and if the tract to be subdivided contains more than 100,000 square feet, the plat shall show contour lines connecting points of equal elevation. Contour intervals shall be 2 feet for average grades up to 5% and 5 feet for average grades over 5%

13. In every drainage report required in any of the provisions of this policy volume, the engineer or surveyor who prepares same shall establish and show upon the subdivision plat that it accompanies, the grade elevation of every drainage ditch; and same shall be shown on such plat at every 300 foot interval in each ditch and at every intersection of roads indicated on each plat.
14. Drainage courses in subdivisions containing small lots and blocks shall be dedicated. In subdivisions containing larger lots or "acreage tracts" an easement will be accepted. A minimum width of 20 feet will be required.
15. Appropriate dedication for public utilities not less than 16 feet wide must be provided where needed, either by absolute dedication or by dedication of easement. Dedicated easements shall be maintained by the owner of the property upon which the easement is located; they shall be located entirely on lots fronting one street only; no structure of any type shall be placed on said easement and unrestricted passage must be maintained at all times.
16. Width of alleys shall be not less than 20 feet.
17. Adequate off-street parking space must be provided in business or commercial areas.
18. Streets shall have a minimum width of right-of-way of eighty feet, and must provide unhampered circulation through the subdivision. Where a dead end street is designed to remain permanently, turn-around shall be provided at the closed end having an outside roadway diameter of 80 feet and a street right-of-way diameter of 100 feet. Dead end streets may be platted where the County Commissioners Court deems desirable and where land adjoins property not subdivided, in which case, the streets shall be carried to the boundaries thereof.
19. Variances of the minimum right-of-way widths may be granted by the Randall County Commissioners Court where it is determined by engineering studies that adequate safety, drainage and maintenance requirements can be maintained. At no time should the minimum right-of-way width be less than 60 feet.
20. Arterial, or main lateral streets, or set back lines, are to be provided where in the judgment of the Commissioners Court, they are necessary.
21. All streets shall intersect at 90 degree angles; where this is not possible, the intersection on the side of the acute angle must be cut back as specified by the Commissioners Court, but in no case shall the cut back be less than 25 feet.

22. In cases where the new streets as platted intersect with established streets, the new streets shall be if practicable, a continuation without offset of any intersecting street on the opposite side of said established street.
23. No street shall have an abrupt offset or "jog" in it.
24. Where streets in an adjoining subdivision dead end at the property line of the new subdivision, said streets shall be continued through the new subdivisions, either on a straight line, or a curve, as provided elsewhere herein. Where no adjacent connections are platted, the streets in the new subdivision must in general be the reasonable projections of streets in the adjacent subdivided tracts. All streets in new subdivisions shall be platted so that a continuation of said streets be made in other subdivisions in the future.
25. Where part of a street has been dedicated in an adjoining subdivision adjacent to and along the common property line of the two subdivisions, enough right-of-way must be dedicated in the new subdivision to provide the minimum width specified herein.
26. No squares, "islands", or other obstructions to traffic shall be reserved within the right-of-way, this shall not exclude small parts where the streets are properly curved, or esplanades.
27. A space measuring 3 inches by 5 inches for the certificate of approval to be filled out by the Commissioners Court shall be provided on the plat.
28. Where there is an existing subdivision and two or more lots are to be re-subdivided, in same, a vacating plat shall be presented to the Commissioners Court for approval prior to filing with the County Clerk. The same specifications shall apply that govern filing of plats in new subdivisions, with the exception that a key map will not be required. The vacating plat shall be a copy of the subdivision plat or part thereof to be vacated, as recorded in the plat records of the County Clerk.
29. A certificate from each Tax collector of a political subdivision in which the property is located must accompany the plat to be recorded, showing that all taxes owing to the State, County School District, and/or any other political subdivision have been paid in full to date.
30. Subdivision plats must have the written approval of Utility Companies as to the proper location of utility easements, which easements are to be shown on the subdivision plat.

31. A requirement for 20 foot recessed gates is in effect on all 80 foot right-of-way fenced roads.

SECTION II - DRAINAGE OF RURAL SUBDIVISIONS

PART A -- DRAINAGE STUDY

1. Every developer or owner who intends to file a plat or subdivision with the County shall first file a copy of an engineer's report with the County Road Superintendent, showing expected drainage flow throughout the area to be subdivided, including all areas to be paved. This study shall show as a minimum all contributing land areas, drainage areas, coefficient of runoff, storm frequency used, calculations and the expected quantity of storm flow for each street. The study shall be based upon the method used by the Soil Conservation Service, the Rational Method or other methods approved by the Randall County Commissioners Court or its agent, the Road Superintendent. All parts of the subdivisions or areas subject to flooding by rainfall shall have drainage facilities adequate to prevent flooding. Notwithstanding the provisions of this paragraph, the Commissioners Court may contract with an independent engineer to ensure that proper engineering consideration has been given in the drainage study as to matters concerning drainage flow.
2. Drainage structures shall be constructed in such locations and of such size and dimensions to adequately serve the subdivision under study, and the contributing drainage area. In new subdivisions, the developer shall provide all of the necessary easements and rights-of-way from the owner and all adjoining owners thereto required by the County Road Superintendent for drainage structures, including storm sewer and open or lined channels. Easement width for open or lined channels shall be at least 20 feet wider than the top of the channel.
3. The design, size, type and location of every storm drainage facility shall be approved by the County Road Superintendent or his agent. All drainage easements shall be clearly shown on every plat of every subdivision by width, length, location and all other dimensions. When water has been diverted through adjacent property to a subdivision, an easement shall be provided by the subdivider to a playa lake or to a point where the water will drain through another waterway.

PART B -- STORM RUN-OFF

1. The subdivider shall design every subdivision and its facilities shall be so constructed that the following minimum

storm run-off frequencies shall be met:

- a. Bridges - 25 years.
 - b. Culverts under 60 inches id - 10 years.
 - c. Curb And Gutter - 2 years.
 - d. Storm sewer - 2 years.
2. No culverts built or replaced in the county shall be less than 24 inches inside diameter unless a request for a smaller diameter is made by the developer and owner and granted by the Commissioners Court at the time it approves the plat. In no case shall the size of culverts built or replaced in the county be less than 18 inches, inside diameter.
 3. Residential streets shall be so designed for the protection to all abutting private property for a 25 year flood frequency.
 4. All traffic lane culverts shall be constructed of reinforced concrete pipe, corrugated galvanized iron minimum 16 gauge, or cast in place reinforced concrete or equal and shall be designed for not less than 5000 pound wheel load.
 5. All drainage pipe shall be of new material.
 6. All drainage plans and all plats submitted to the County by and through its Commissioners Court or Road Superintendent shall show all drainage routing, including drainage overflow flooding for the storm frequency equal to the regulatory 100 year flood. Drainage plans and plats shall show the limit of the flood hazard area corresponding to the regulatory 100 year flood plain.

PART C -- DRAINAGE DITCHES

1. Open or lined drainage ditches or both shall be constructed across the entire area of each subdivision required to be submitted for approval under provisions of this policy volume. The design, type, size and location of every drainage ditch shall be approved by the County Road Superintendent or his agent and shall conform to the specifications for drainage ditches attached to and made a part of this policy document. Where curb and gutter is required, water in excess of what gutters will carry at maximum design flow shall be diverted into storm sewer channels.
2. Unless otherwise specified herein, all drainage ditches in subdivision areas with ground slope factors of one percent or less shall conform to the following specifications:
 - a. Ditches shall be of flat bottom design.
 - b. Ditches shall have bottom width 8 feet.

- c. Ditches shall have a depth not to exceed 9 inches.
- d. Ditch front slopes and back slopes shall not be steeper than 18:1.
- e. Ditches shall be bluetopped and cut to a minimum of one percent in order to maintain a one percent slope.
- f. In subdivision areas where depths of drainage ditches must exceed 9 inches, the ditches shall be designed to the engineer's specifications as set forth in the drainage report submitted by the developer.

PART D -- FLOODPLAIN PERMITS

1. Anything herein to the contrary, notwithstanding, every rural residence and commercial structure to be occupied by any person or persons and to be situated within the limits of Randall County and outside the limits if any incorporated town or city shall be subject to the requirements of obtaining, first, from the Randall County Flood Inspection Agent, a Floodplain Permit, prior to the commencement of any work to construct the same, or to add onto any existing dwelling or commercial structure, or to move onto from another location, any dwelling or commercial structure. At the time this is written and passed by the Court, the flood inspection agent shall be the Randall County Road Superintendent, but some other agent of Randall County Commissioners Court may hereafter be designated by supplemental order of the Court amending this portion of such current order.
2. Any violation hereof shall constitute a class C misdemeanor. Each day of violation shall be a separate offence.

SECTION III - ROAD AND STREET CONSTRUCTION IN RURAL SUBDIVISIONS

PART A - GENERAL PROVISIONS

1. The subdivision owner or his road construction contractor shall give reasonable notice to the County Road Superintendent or to the Commissioners Court when the construction is to start upon any road, curbs, gutters, culverts, drainage structures, or concrete entryways in their subdivision, and shall also call for final inspection of same upon completion. Failure to give reasonable notice as herein provided can be expected to delay final approval by the court until the owner proves, at his own expense, to the satisfaction of the Road Superintendent and the Commissioners Court of Randall County that the work done has met the specifications provided for in this policy volume.

2. Before building any street or road, the subdivider shall furnish the County Commissioners with reports of analysis of the proposed material made by an approved laboratory. Preliminary approval of a source does not guarantee acceptability of all material obtained therefrom. The owner, or his representative shall furnish evidence of conformity with these specifications whenever called upon to do so by the County Commissioners. This applies to plans, specifications and profiles.
3. Effective as of January 9, 1984, all plats and subdivisions submitted for approval and filing in Randall County shall have a permanent benchmark and known elevation. The benchmark shall be within the boundary of the subdivision, and located in county right-of-way. The location and elevation of the benchmark shall be shown on the plat. The benchmark shall be a concrete monument, 6" diameter, with a minimum 24" buried in the ground. The monument shall have a brass plate set in the top on which shall be shown the benchmark elevation, name, and registration number of the person who established the benchmark stamped with letters a minimum of 1/4" in height. The elevation shall be established by, or under the supervision, of either a registered professional engineer or a registered public surveyor. The elevation shall be based upon "mean sea level".
4. In the event any rule or regulation made anywhere within this statement of policy shall be overturned by any Court, or, declared unconstitutional or contrary to statute, all of the other provisions hereof shall be unaffected and unimpaired by any such event.
5. The rules and statements of policy are subject to change, amendment or alteration by the court, without notice, when in the judgement of the Commissioners Court the interest of the public will be best served.

PART B -- ROAD AND STREET DESIGN STANDARDS IN SUBDIVISIONS:

1. Construction of all streets and approval by the county shall be mandatory before street paving is accepted for maintenance by the County. All street paving shall conform to the following minimum standards: Six inches of compacted crushed stone, gravel or crushed caliche base with prime or tack coat and 1-1/2 inch of hot mix asphaltic concrete or two course surface treatment. All base courses shall be constructed on a subgrade approved by the County Road Superintendent or his agent. In areas of poor subgrade, the developer may be required to stabilize the subbase material with lime or other approved materials to obtain acceptable subgrade condition.

Standard methods of compaction of the base shall be used and the base course shall be approved by the County before the surface course is placed.

2. Unless express written authority to the contrary is given by the Randall County Commissioners Court, all streets and roads IN ALL RURAL SUBDIVISIONS (outside the incorporated limits of any city or town in or adjacent to the county) hereafter approved by the Randall County Commissioners Court, shall be paved either with asphalt or asphaltic concrete, and all such paving shall be installed and completed in keeping with the specifications and requirements set forth herein. (emphasis added)
3. Curb and Gutter shall be required to be constructed on all streets where lots are less than 165 feet in width, with such width to be measured along the right-of-way and shall be the part fronting on the street rather than on a side street. Radial curb and gutter shall be constructed at each corner upon each block of a subdivision upon which curb and gutter is constructed. All concrete used in all such construction shall be in accordance with the specifications attached to and made a part of this policy document, such concrete shall be 2500 psi minimum. The compressive strength of the concrete shall be not less than 2500 psi in 28 days and the cement content shall be not less than 4 3/4 sacks per cubic yard. Where the subgrade is rock, the rock shall be removed to a depth of four inches and backfilled.
4. Street right-of-way widths shall be in conformity with requirements or projected traffic needs. In no event, however, unless approved by the County, shall such widths be less than the following:

Street Type	R-O-W Width	Minimum paved width	
		With C & G	Without C & G
Major or Arterial	120 feet	54 feet	40 feet
Secondary	100 feet	44 feet	30 feet
Local	80 feet	-----	24 feet
Local & Secondary	60 feet	31 feet	-----

Where topographical conditions, drainage canals, proposed limited development on one side of the street or other special conditions warrant a street of less than the above widths, a lesser width may be approved by the County.

5. Street name signs shall be installed, by the developer, at the intersections of all streets and at all entries and exits of a subdivision. The construction of all street sign assemblies shall conform to the specifications for those assemblies attached to and made a part of this policy document.

All assemblies and locations must be approved by the Randall County Road Superintendent or his agent prior to installation.

6. No traffic control devices, such as stop signs or yield signs shall be placed in any subdivision unless placed by, or under the direction of the Randall County Road Department. The developer or his road construction contractor should set up an appointment with the Randall County Road Superintendent or his agent to determine if any traffic control devices are necessary prior to opening up any street or road to the public. If any stop signs or yield signs are found to be necessary, they will be provided and placed by the County sign man at the expense of the developer.
7. Unless otherwise approved by the County Road Superintendent or his agent, all drainage ditches shall be of a flat bottom design of sufficient dimensions to allow for the installation of dip type concrete driveways or entryways into each lot or parcel that is included or shown in the subdivision or plat thereof.
8. One (1) concrete entryway is required for each lot or parcel that is included or shown in the subdivision or plat thereof. This requirement applies to both the owner and developer who obtains the original subdivision of unplatted land and to any owner and developer who further subdivides platted land into smaller lots or parcels. In every case of further subdivision of already platted property the owner requesting the further subdivision is considered to be the developer. It shall be the responsibility of the owner and developer to install the entryway at the time each lot or parcel of land is sold, leased or otherwise transferred in any manner to another person, firm or corporation, except in instances where lots or parcels are sold or transferred before the paving of the street is complete, in which case the concrete entryways will be installed after the final road and ditch grades have been established.

SECTION IV - BONDS FOR CONSTRUCTION AND MAINTENANCE OF SUBDIVISION ROADS

PART A -- CONSTRUCTION BONDS

1. The term "roads" shall be construed to include, in its meaning, both streets and alleys where avenues for traffic of any kind are intended to be included in any plat or subdivision.

2. In order to insure that the roads in accepted and approved subdivisions are constructed in accordance with the specifications set forth herein, the owner shall file a Construction Bond, executed by some surety company authorized to do business in this state, which bond shall be payable to the County Judge of Randall County or to his successors in office. The construction bond shall be filed with the County Judge before any construction of road is begun in the subdivision, and shall be maintained in full force and effect until all work is completed and accepted by the county, and shall be in an amount to be fixed and determined as follows:
 - a. Where no drainage structures or other additions are involved:
 1. Paved streets with curb \$ 30.00 per linear ft.
 2. Paved streets 16.00 per linear ft.
 3. Each concrete entryway 500.00 each.
 - b. Where drainage structures or other additional construction costs are involved, add estimated cost of additional work to the amount of the bond determined under provisions of "a" above..

3. The condition of said Construction Bond shall be that the owner and developer of said approved and accepted subdivision shall begin construction of the roads shown on the subdivision within a period of ninety (90) days after day of approval of the plat of the said subdivision, unless a request for a longer period of times is made by the developer and owner and granted by the Commissioners Court at the time it approves the said subdivision plat. In no case, however, shall the extended period of time be longer than 360 days.

4. Once construction is begun, the developer and owner agree to prosecute, and shall be required to prosecute and complete such construction in accordance with the specifications herein provided within a reasonable number of working days to be determined and agreed upon by the owner and the Commissioners Court, and said construction bond shall remain in full force and effect until all of the roads in said approved and accepted subdivision have been completed to the satisfaction of the Commissioners Court.

5. In the event any or all of the streets and alleys as constructed by the owner fail to meet the requirements of the specifications herein provided and are not accepted and approved by the Commissioners Court, and said owner fails or refuses to correct the defects called to his attention in writing by said Commissioners Court, the unfinished improvements shall be completed at the cost and expense of obligors as in said orders provided.

6. Recovery on said bonds shall not be limited or exhausted by one or more recoveries less than the total amount of such bonds. Unless it is prohibited by Constitution or Statute, wherever the County is entitled to recover on such a bond, it shall also be entitled to receive and obligors shall pay reasonable attorney fees to the County.

PART B -- MAINTENANCE BONDS

1. In order to insure and guarantee that the roads in accepted and approved subdivisions are maintained by the developer to the satisfaction of the Commissioners Court for a period of two (2) years after the approval and acceptance of each road or portion thereof (or until the density prerequisites for acceptance of maintenance by the County, hereinafter stated, have been satisfied, the later event controlling [see item 7 of this, Part B - Maintenance Bonds]) a Maintenance Bond shall be filed with the County Judge or his successors in office prior to the acceptance of the construction of the roads therein. Such bond shall be in an amount to be fixed and determined as follows:
 - a. For paved streets with curb and gutter-- 15% of the amount of the construction bond.
 - b. For paved streets without curb and gutter-- 15% of the amount of the construction.
2. The condition of the said Maintenance Bond shall be that the owner shall guarantee to maintain, to the satisfaction of the County Commissioners Court, all of the streets and alleys shown on the applicable accepted and approved subdivision plat, in a good state of repair for the period of two (2) years from the date of such acceptance and approval.
3. The maintenance bond by its terms shall provide that liability thereunder shall begin on any or all of the streets and alleys shown on an accepted and approved subdivision plat and remain in full force and effect for the period of two (2) years thereafter, from the date of the acceptance of the construction of each street or portion thereof, by the County Commissioners Court in writing, as is by law and orders of the Commissioners Court of Randall County, Texas.
4. Periodic inspection of all of the streets and alleys that have been approved and accepted in an accepted and approved subdivision will be made by the County Commissioners during the period of liability covered by the Maintenance Bond, and in the event that any or all of said streets and alleys are not being maintained in a good state of repairs, the owner will be so advised in writing and if after a reasonable time he fails or refuses to properly maintain said streets and alleys, they shall be maintained at the cost and expense of obligors as in said orders is provided.

5. Each of said bonds shall provide that should the same be unenforceable as a statutory bond, the obligors shall be bound by their contract as a common law obligation.
6. Recovery on said Bonds shall not be limited or exhausted by one or more recoveries less than the total amount of such bonds. Unless it is prohibited by Constitution or Statute, wherever the County is entitled to recover on such a bond, it shall also be entitled to receive and obligors shall pay reasonable attorney fees to the County.

SPECIAL PROVISIONS FOR ROAD MAINTENANCE

Notwithstanding any other provision in this Resolution regarding subdivisions, streets and roads, the Commissioners Court will not accept the streets for maintenance by the County in any rural subdivision, although all of the other requirements hereinmade have been met, until at least 60 percent of the total area of the subdivision (exclusive of streets and easements) in the form of lots, tracts and parcels, have been actually sold, and 40 percent thereof has been improved in the form of residence or business structures. That percentage of occupancy and sales shall be determined by the Commissioners Court upon request of the developer-subdivider or any owner-occupant of the subdivision who desires such acceptance for maintenance of such roads by Randall County. When in the opinion of the Commissioners Court it is proper to depart from this ownership-develop-requirement before acceptance of roads for maintenance, and therefor to accept roads in a particular subdivision in the form of a variance herefrom, the Commissioners Court may do so without prejudice to the requirement and/or guideline hereby established.

SECTION V -- MAINTENANCE OF STREETS AND ROADS

PART A - PIT RUN CALICHE

1. With reference to Resolution number 81-79 (exhibit attached), The Road Superintendent will, with the submission of the annual Road Department budget, include a report to the Commissioners Court showing dirt road density computations so that the upgrading of dirt roads to all weather roads will proceed in an orderly manner.
2. Special priority may be given to citizens whose homes and/or businesses are on rural dirt roads and who as a group make a good faith offer to engage in reasonable participation in the cost all weather surfacing of roads adjacent to their premise. Reasonable participation is intended to mean 50% or more of anticipated cost of upgrading on a particular project. By cost, is intended to mean the cost of materials, delivered to the site, and the fuel cost of all equipment used to complete the v

3. During any budget year where reasonable financial participation offers are outstanding, it will be the intent of the Court to devote 75% of the funds budgeted for upgrading county rural roads to projects in which there is no private citizen participation and 25% thereof to upgrading roads given priority due to reasonable participation.
4. Road upgrading will not be done on less than half-mile increments unless the road is less than half mile in total length. Any section of road upgrading will begin or end at another all weather surfaced road. Any road that qualifies for upgrading under the density program defined above will be upgraded on the basis of the closest route to an all-weather road.
5. The number of miles of road to be upgraded each year will be determined by the amount of funds budgeted, not by any set number of section-miles. The cost of upgrading will include the cost of materials, delivered to the job site, and the fuel cost of all equipment used to complete the work.

PART B - SEALING PIT RUN CALICHE

1. On certain rural county roads that have been upgraded with "pit run caliche", the Commissioners Court may direct the Road Department to apply a two course surface treatment to protect the caliche from deterioration and to facilitate maintenance.
2. The Road Superintendent shall evaluate each caliche road considered for sealing to ensure that no such road is thus treated that may become a major arterial route or a route that might sustain heavy, continual truck or commercial traffic. These roads should be paved according to more stringent specifications detailed elsewhere in this policy document.
3. Priority consideration will be given to residents and land owners along roads who are willing to participate, on a 50% basis, with the county to share in the cost of sealcoating roads that qualify under this maintenance policy.
4. After initial sealcoating of participation roads, the County will maintain these roads at 100% county expense.

CONCLUDING SPECIAL PROVISIONS

A. It is specifically the intent of the Randall County Commissioners Court, and it does, hereby to adopt all of the SPECIFICATIONS FOR CONSTRUCTION OF PAVING and all of the provisions for ESTIMATING STORM WATER RUNOFF set forth in the exhibits so entitled, attached hereto and made a part hereof, and all such provisions therein are hereby incorporated herein and made a part hereof for all purposes consistent herewith.

B. All of the provisions of this Resolution and Order of this Court shall take effect ten (10) days after the publication of the following notice in the Canyon, Texas, News, and in the Amarillo News and Globe-Times newspaper, without any further action or order of this Court, such notice to read as follows:

THE RANDALL COUNTY COMMISSIONERS COURT, in Regular Session hereby gives notice that on december 28, 1981, it approved and passed Resolution No. 81-85 which is an Order for the Establishment of Regulations Governing the Platting and Recording of Rural Subdivisions and Governing Drainage and Road and Street Building in Subdivisions, but that same shall not become final or effective until ten (10) days after the publication of this notice in this publication. Anyone who desires to do so may procure and/or read a copy of such Regulations at the office of the County Judge of Randall County, Texas, or at the office of the County Auditor of Randall County, Texas, and thereafter appear before the Commissioners Court of Randall County on the 4th day of January, 1982, in order to question or object to any portion of such regulations.

of such regulations.

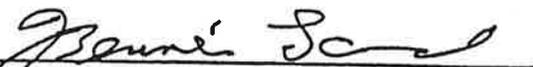
C. The Randall County Commissioners Court shall be able to and may amend or supplement or add to any part or provision of these regulations at any regular session of the Court by placing the subject hereof on the agenda of the Court pursuant to the provisions of The Texas Open Meeting Law, which is the common name for Article 6252-17 of the Revised Civil Statutes of Texas.

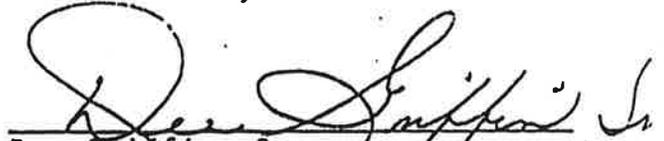
CONSIDERED, PASSED, AND SO ORDERED by the Randall County Commissioners' Court, subject to the effective dates and notices hereinabove provided for, this the 28th day of December, A. D. 1981, at Canyon, Randall County, Texas.

THE RANDALL COUNTY COMMISSIONERS COURT
Randall County, Texas:


Eugene Klein, Jr.
Commissioner, Pct. #1


John Fulgenzi,
Commissioner, Pct. #2


Kenneth Land,
Commissioner, Pct. #3


Dee Griffin, Sr.,
Commissioner, Pct. #4


CHARLES M. PURCELL,
Randall County Judge

ATTEST:


Leroy Hutton, Randall County Clerk

PAVING TESTING REQUIREMENTS

All testing procedures performed on all paving and grading materials used and to be used on Randall County rural roads shall conform to Texas Highway Department standards.

Density Test on Subgrade and Base

	Frequency	Required Density
1) Fill areas	One test for each 1000 cubic yards compacted	95% Standard Proctor (ASTM D-698)
2) Subgrade	One test for each 1000 feet on 26' wide subgrade	95% Standard Proctor (ASTM D-698)
3) Base	One test for each 1000 LF.	95% Standard Proctor (ASTM D-698)

Should any test fail to meet the specification requirements, that section represented by the test is to be corrected and retested until compliance is achieved.

All testing performed on all paving and grading materials used and to be used on Randall County Rural Roads shall be performed at the sole and complete expense of the subdivider/developer, and at no expense to Randall County.

SPECIFICATIONS FOR CONSTRUCTION OF PAVING

The minimum requirements for paving are outlined below with detailed specifications included herein. Each newly paved road shall meet these requirements:

1. Grading and compacting subgrade.
2. Base course - 6" minimum compacted depth for minor streets.
3. Prime coat - 0.30 gallons per square yard of MC-30 or approved equal.
4. Tack coat (if hot mix surface is used) - 0.04 to 0.08 gallon per square yard of approved material (EA 11M with 85% water or equal).
5. 1-1/2 inch hot mix surface course or two course surface treatment.

CONCRETE CURB, GUTTER AND VALLEY

DESCRIPTION. "Concrete Curb, Gutter and Valley" shall consist of Portland cement concrete curb, gutter and valley constructed on an approved subgrade in accordance with this specification and in conformity with the lines and grades established by the Engineer and details shown on the plans.

MATERIALS. Aggregates shall consist of durable particles of gravel or crushed stone, free from injurious amounts of soft friable, thin, elongated or laminated pieces, soluble salts, organic or other deleterious matter.

Fine aggregate shall consist of either natural or stone sand composed of sound particles of approved stone, free of clay or other adherent coating and injurious amount of deleterious matter.

Cement shall be Portland standard brand of cement, high early strength, and shall conform to the requirements of the current Federal Specifications SS-G-192 or equal.

Water shall be free from substances deleterious to the hardening of the cement treatment and shall be approved by the Engineer.

When tested by means of laboratory sieves, gradation of aggregates shall meet the following requirements:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve	
	Coarse Aggregate	Fine Aggregate
Retained on 1-1/2" sieve	100	0
Retained on 1" sieve	95-100	0
Retained on 1/2" sieve	35-70	0
Retained on 3/8" sieve	0	100
Retained on No. 4 sieve	0-10	95-100
Retained on No. 16 sieve	0	45-80
Retained on No. 50 sieve	0	10-30
Retained on No. 100 sieve	0	2-10

PROPORTIONS. Concrete shall contain a minimum of 5 bags of cement per cubic yard and shall be proportioned as follows:

Water	6 gallons
Fine aggregate	225 pounds
Coarse aggregate	414 pounds

(The above based on (1) Specific gravity of aggregates at 2.65, and (2) Quantities based of each bag of cement. Any change in these proportions will be made by the Engineer only).

CONSTRUCTION METHODS. Preparation of subgrade. Soil shall consist of approved material free from vegetation or other objectionable matter encountered in the existing subgrade and other acceptable material used in preparation of the subgrade in accordance with this specification. The subgrade shall be prepared and shaped, rolled and uniformly compacted to conform with the accepted cross sections and grades as established by the Engineer.

FORMS. The forms shall be of wood or metal of a section satisfactory to the Engineer, straight, free of warp and of a depth equal to the depth of the curb and gutter. They shall be securely staked to line and grade and maintained in a true position during the depositing of concrete. Where a face form for a curb is used, it shall be of such design as to permit it to be securely fastened to the other forms.

PLACING AND FINISHING CONCRETE. The subgrade shall be sprinkled lightly before concrete is deposited thereon. Concrete shall be mixed in a manner satisfactory to the Engineer; it shall be placed in the forms and thoroughly tamped in place so that all honeycombs will be eliminated and sufficient mortar will be brought to the surface. The exposed surface shall be thoroughly worked with a wooden float. All faces adjacent to the forms shall be spaded so that after the forms are stripped, the surface of the faces will be smooth even and free of honeycomb. All edges shall be tool-rounded.

EXPANSION AND CONTRACTION JOINTS FOR CONCRETE. One-half inch expansion joints shall be placed at intervals not exceeding 40 feet. At intervals not more than 10 feet nor less than 5 feet the concrete shall be scored for a depth equal to one-third the total depth of the concrete. Expansion joint material shall be 1" redwood or 1/2" asphalt impregnated fiber and shall be cut to conform to thickness of concrete.

CURING. After the concrete has been finished as specified herein, the surface shall be protected against rapid drying for a period of not less than 3 days and longer if necessary. It shall be kept protected from the elements in a satisfactory manner. An approved curing compound shall be sprayed on all concrete faces upon finishing.

BACKFILLING. Backfill shall be of suitable selected material and shall be placed and tamped in layers of not over 6" in depth until firm and solid. Backfilling shall follow immediately after the concrete forms have been removed.

WEATHER LIMITS. No concrete shall be poured on a frozen or thawing subgrade, during unfavorable weather conditions or when the air temperature is 40 F. and is falling.

VALLEYS. Valleys shall be governed by the above specifications. They shall be 6" in depth and reinforced with 6x6 No. 6 welded wire mesh. Mesh shall extend from radius to radius and shall be kept at a minimum of 2" from bottom of valley while concrete is being poured.

GRADING

DESCRIPTION: This item consists of excavating, preparing subgrade, hauling, constructing embankment, wasting and filling back of curbs as set forth by the drawings and directed by the ENGINEER.

CLASSIFICATION: All excavation shall be "unclassified".

CONSTRUCTION METHODS: EXCAVATION. All excavation shall be removed to the grade and section established. Any excavation not authorized beyond such limits shall be backfilled, compacted and shaped as directed by the ENGINEER.

EMBANKMENT. As herein implied, shall be considered as all fills to support a pavement or roadway. All areas upon which embankment is to be placed shall be cleared and scarified 6" deep and compacted before placing material. Material may come from excavated areas; the top 12" of material shall be selected by the ENGINEER from excavated areas. It shall be placed in successive horizontal layers not exceeding 8" loose depth.

Each layer shall be sprinkled to optimum moisture condition and then rolled until 95% Standard Proctor Density is obtained with sheep foot or pneumatic rollers.

SUB-BASE PREPARATION. The subgrade, upon which base course is to be placed, shall be thoroughly compacted and accurately shaped. In general, a tolerance of 1/2" will be allowed in checking the section provided such deviation is not extended over 6' and is not consistently off in the same direction. The CONTRACTOR shall furnish straight edge, template, or other means approved by the ENGINEER for checking the subgrade. The subgrade shall be moistened sufficiently for the moisture to penetrate a minimum of 3" and if necessary, it shall be scarified to obtain such moisture penetration. It shall be rolled with approved pneumatic or iron wheel rollers and worked with a heavy maintainer in good condition with a wheel base of 16' or more. If the subgrade has hard and soft spots or any other nature which tends to make the surface non-uniform, it shall be scarified, sprinkled and rolled as directed, to bring it to a uniform surface. Any unstable, loose or otherwise unsatisfactory spots appearing shall be corrected by replacing the material or as directed by the ENGINEER. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work. Subgrade shall be maintained free of holes, ruts and loose spots prior to placing the base.

GRADING BACK OF CURBS. The area back of the curbs in the street shall be filled with material from the excavation. Such fill shall be carried to the top of the curb and sloped upward therefrom approximately 1/4" per foot or as directed by the ENGINEER. The upper 6" of the fill shall be earth, free of rock or objectionable material. The fill shall be shaped to present a neat appearance and to drain. Where necessary to excavate material back of curbs to obtain a uniformly sloped section from top of curb to sidewalk or property line, such work shall be performed and included as incidental to the item of Grading set forth herein.

WASTING. Excess excavated material shall be wasted in areas designated by the ENGINEER or as shown on the plans. This material shall be placed in layers not exceeding 12" loose and each layer worked with blade in order to obtain compaction. The waste shall be placed and finished to grades and section shown or directed. The top 12" layer shall be free of rock or other objectionable material. The waste areas shown on the plans are tentative and no assurance is given that they will be constructed as shown though it is the preferred use of waste materials. It shall be the responsibility of the CONTRACTOR to satisfactorily dispose of any waste material not used as shown or directed by the ENGINEER without additional compensation.

LIME TREATED SUBGRADE

SCOPE. The work covered by this section of the specifications consists of furnishing all plant, labor, and equipment, and of performing all operations in connection with the treating of subgrade by mixing hydrated lime with the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

APPLICABLE SPECIFICATIONS. The following specification forms a part of this specifications: Standard Specifications For Construction of Airports dated June 1959 Item T-611 Compaction Control Tests Methods "A" and "B".

MATERIALS. (1) The lime shall meet the requirements of the Item, "Hydrated Lime and Lime Slurry" for the type of lime specified.

When Type B, Commercial Lime Slurry is specified, the Contractor shall select, prior to construction, the grade to be used and shall notify the Engineer in writing before changing from one grade to another.

(2) The percent of lime to be used for the treated subgrade will be selected from preliminary laboratory tests and will be dependent on a substantial reduction in plasticity index of the treated material accompanied by a satisfactory increase in strength as reflected by remoulded and soaked CBR determinations.

EQUIPMENT. (1) The machinery, tools and equipment necessary for proper prosecution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations. All machinery, tools and equipment used shall be maintained in a satisfactory working condition. The Contractor shall employ adequate methods in performing the work and shall conduct his operations in a satisfactory and workmanlike manner.

(2) Hydrated Lime shall be stored and handled in closed weatherproof containers until immediately before distribution on the subgrade. If storage bins are used they shall be completely enclosed. Hydrated lime in bags shall be stored in weatherproof buildings with adequate protection from ground dampness.

(3) If lime is furnished in trucks, each truck shall have the weight of lime certified on public scales or the Contractor shall place a set of standard platform truck scales or hopper scales at a location approved by the Engineer.

(4) If lime is furnished in bags, each bag shall bear the manufacturer's certified weight. Bags varying more than 5 percent from that weight may be rejected and the average weight of bags in any shipment, as shown by weighing 50 bags taken at random, shall not be less than the manufacturer's certified weight.

(5) PULVERIZING MIXER. The pulverizing mixer shall be an approved power driven towed or self-propelled type soils pulverizer capable of thoroughly blending the natural subgrade with the lime additive to a depth of at least six inches.

(6) 25-TON PNEUMATIC ROLLERS. The 25-ton pneumatic rollers shall be of an approved type and shall be of such size and ply as to be capable of being operated at tire pressures between 50 and 85 pounds per square inch.

(7) TAMPING ROLLERS (SHEEPFOOT TYPE). Tamping rollers shall consist of one or more units. Each unit shall consist of a watertight cylindrical drum not less than 48 inches in length, surmounted by metal studs with tamping feet projecting not less than 7 inches from the surface of the drum, and spaced not less than 6 nor more than 10 inches, measured diagonally from center to center. The tamping foot shall be approved type suitable device for compacting subgrades. Each unit shall be equipped with a suitable device for cleaning the tamping feet. The rolling units of multiple type tamping rollers shall be pivoted on the main frame in a manner which will permit the units to adapt themselves to uneven ground surfaces and to rotate independently. When fully loaded, the roller shall produce at least 300 pounds per square inch on the combined areas of the tamping feet in contact with the ground.

(8) BLADE GRADERS. Blade graders shall have a wheel base of not less than 15 feet, a blade of not less than 10 feet, and shall be self-propelled.

(9) SPRINKLING EQUIPMENT. The sprinkling equipment shall consist of tank trucks, pressure distributors, or other equipment designated to apply water uniformly and in controlled quantities to variable widths of surfaces.

(10) TRACTORS. Tractors shall be of the crawler type, suitable for compacting subgrades, except that tractors used for pulling rubber-tired rollers shall have pneumatic tires.

(11) DISKS. Disks shall be of the tandem type.

(12) HAULING EQUIPMENT. Hauling Equipment shall consist of pneumatic, tired vehicles having dump bodies suitable for dumping materials in windrows or in layers.

(13) SCALES. Scales shall be standard truck scales of the beam type. The scales shall be of sufficient size to accommodate all trucks hauling the lime. The scales shall be tested, approved and sealed by an inspector of the State Inspection Bureau. Scales shall be calibrated and resealed as often as necessary to insure accuracy.

(14) LIME SPREADER. The equipment for spreading lime on the subgrade shall consist of screw type spreader boxes or other equipment which shall demonstrate its ability to distribute the lime at controlled amounts uniformly over the subgrade.

(15) MISCELLANEOUS EQUIPMENT. Scarifiers, spring-tooth or spike-tooth harrows, and other equipment shall be of approved types, suitable for constructing the treated subgrade.

CONSTRUCTION METHODS. It is the primary requirement of this specification to secure a completed subgrade containing a uniform lime mixture, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses.

It shall be the responsibility of the Contractor to regulate the sequence of his work, to use the proper amount of lime, maintain the work and rework the courses as necessary to meet the above requirements.

Prior to beginning any lime treatment, the subgrade shall be constructed and brought to grade as specified in the section on "Excavation and Embankment" and shaped to conform to the typical sections, lines and grades as shown on the plans or as established by the Engineer. The material to be treated shall then be excavated to the secondary grade (proposed bottom of lime treatment) and removed or windrowed to expose the secondary grade. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the Engineer, by scarifying, adding lime, and compacting until it is of uniform stability. The excavated material shall then be spread to the desired cross section.

If the Contractor elects to use a cutting and pulverizing machine that will remove the subgrade material accurately to the secondary grade and pulverize the material at the same time he will not be required to expose the secondary grade nor windrow the material. However, the Contractor shall be required to roll the subgrade, as directed by the Engineer, before using the pulverizing machine and correct any soft areas that this rolling may reveal. This method will be permitted only where a machine is provided which will insure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut. The machine shall be of such design that a visible indication is given at all times that the machine is cutting to the proper depth.

(2) APPLICATION. Lime shall be spread only on that area where the first mixing operations can be completed during the same working day.

The application and mixing of lime with the material shall be accomplished by the methods hereinafter described as "Dry Placing" or "Slurry Placing". When Type A, Hydrated Lime, is specified, the Contractor may use either method.

(a) DRY PLACING. The lime shall be spread uniformly over the top of subgrade by an approved screw type spreader box or other approved spreading equipment at the rate of 3 percent by dry weight of the soil for the top 6 inches of subgrade.

The lime shall be distributed in such manner as to reduce the scattering of lime by wind to a minimum. Lime shall not be applied when wind conditions, in the opinion of the Engineer, are such that blowing lime becomes objectionable and lime is being wasted. A motor grader shall not be used to spread the lime.

The material shall be sprinkled as directed by the Engineer, until the proper moisture content has been secured.

(b) SLURRY PLACING. The lime shall be mixed with water in trucks with approved distributors and applied as a thin water suspension or slurry.

Type B, Commercial Lime Slurry, shall be applied with a lime percentage not less than that applicable for the grade used. The distribution of lime shall be attained by successive passes over a measured section of subgrade until a lime content of 3 percent by dry weight of the material for the top 6 inches of subgrade has been attained. The distributor truck shall be equipped with an agitator which will keep the lime and water in a uniform mixture.

(3) Mixing. The mixing procedure shall be the same for "Dry Placing" or "Slurry Placing" as hereinafter described.

(a) FIRST MIXING. The fill depth of the treated subgrade shall be mixed with an approved mixing machine. Lime shall not be left exposed for more than 6 hours. The mixing machine shall make two coverages.

Water shall be added to the subgrade during mixing to provide a moisture content above the optimum moisture content of the material and to insure chemical action of the lime and subgrade. After mixing the subgrade shall be rolled with a light rubber-tired roller to seal the surface and help prevent evaporation of moisture. The water content of the subgrade mixture shall be maintained at a moisture content above the optimum moisture content for a minimum of 48 hours or until the material becomes friable. During the curing period the material shall be sprinkled as directed.

(b) FINAL MIXING. After the required curing time, the material shall be uniformly mixed by approved methods. If the mixture contains clods, they shall be reduced in size by blading, discing, harrowing, scarifying or the use of other approved pulverization methods so that when all nonslaking aggregates retained on the No. 4 sieve are removed the remainder of the material shall meet the following requirements when tested dry by laboratory sieves:

	Percent
Minimum passing 1 3/4" sieve	100
Minimum passing No. 4 sieve	60

During the interval of time between application and mixing, hydrated lime that has been exposed to the open air for a period of 6 hours or more, or to excessive loss due to washing or blowing will not be accepted for payment.

(4) COMPACTON. Compaction of the mixture shall begin immediately after final mixing and in no case later than 3 calendar days after final mixing, unless approval is obtained from the Engineer. The material shall be aerated or sprinkled as necessary to provide the optimum moisture. Compaction shall begin at the bottom and shall continue until the entire depth of mixture is uniformly compacted. The entire thickness of the treated subgrade shall be compacted to a density of at least 95 percent of maximum density at optimum moisture as determined by the Compaction Control Tests, Item T-611.

The material shall be sprinkled and rolled as directed by the Engineer.

All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and reshaping and recompacting by sprinkling and rolling. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests as necessary will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown on the plans and to the established lines and grades. Should the material due to any reason or cause, lose the required stability, density and finish before the next course is placed or the work is accepted, it shall be recompacted and refinished at the sole expense of the Contractor.

FINISHING, CURING AND PREPARATION FOR SUBSEQUENT COURSES.
After the final layer or course of the lime treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling as directed with a pneumatic or other suitable roller sufficiently light to prevent hair cracking. The completed section shall be moist-cured for a minimum of 7 days before further courses are added or any traffic is permitted, unless otherwise directed by the Engineer. Subsequent courses shall be applied within 14 days after the subgrade is finished.

MEASUREMENT. Lime treatment of the subgrade shall be measured by the square yard to neat lines as shown on the typical sections.

FLEXIBLE BASE

(Caliche)

Description

"Flexible Base, (Caliche)" shall consist of foundation course for surface course; shall be composed of crushed caliche and stone materials; and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown on plans and to the lines and grades as established by the engineer.

Material

The material shall consist of argillaceous limestone, calcareous clay particles, with or without stone, conglomerate, gravel, sand or other granular materials. The materials shall be approved by the Engineer at the source. All the acceptable materials shall be screened, and the oversize shall be crushed and returned to the screened material again in such manner that a uniform product will be produced. Samples for testing the material shall be taken prior to the compaction operations.

Type F Caliche

When tested by the Texas Highway Department standard laboratory methods, the flexible base material shall meet the following requirements:

Retained on square sieve	%
1 3/4"-----	0
No. 4 -----	45-75
No. 40 -----	50-85

Material passing the No. 40 sieve shall be known as "Soil Binder" and shall meet the following requirements when prepared in accordance with Test Method Tex-101-E procedure:

The liquid limit shall not exceed ----- 40
The plasticity index shall not exceed -- 12

Material Sources

The contractor shall select his own material source. All materials shall be crushed at the material source and stock piled and shall meet the above specifications.

When the material is loaded to be hauled to the roadway, it should be loaded from the bottom to top, the full face of the stockpile.

Construction Methods

(1) PREPARATION OF SUBGRADE. The roadbed shall be excavated and shaped in conformity with the typical sections shown on plans and to the lines and grades as established by the Engineer. All unstable or otherwise objectionable material shall be removed from the subgrade and replaced with approved material. All holes, ruts and depressions shall be filled with approved material, and if required, the subgrade shall be thoroughly wetted with water and reshaped and rolled to the extent directed in order to place the subgrade in an acceptable condition to receive the base material.

The surface of the subgrade shall be finished true to line and grade as established and in conformity with the typical section shown on plans. Any deviation in excess of 1/2 inch in cross section and in length of 16 feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work. Material excavated in the preparation of the subgrade shall be utilized in the construction of adjacent shoulders and slopes or otherwise disposed of as directed, and any additional material required for the completion of the shoulders and slopes shall be secured from sources indicated on plans or designated by the Engineer.

(2) FIRST COURSE. Immediately before placing the base material, the subgrade shall be checked as to conformity with grade and section and shall be approved by the Engineer prior to dumping caliche.

The material shall be delivered in approved vehicles of a uniform capacity and it shall be the charge of the Contractor that the required amount of specified material shall be delivered in each 100-foot station. Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise directed by the Engineer in writing. In the event inclement weather or other unforeseen circumstances render impractical the spreading of the material during the first 24-hour period, the material shall be scarified and spread as directed by the Engineer. The material shall be sprinkled, if directed, and shall then be bladed, dragged and shaped to conform to typical sections as shown on plans. All areas and "nests" of segregated course of fine material shall be corrected or removed and replaced with well graded material, as directed by the Engineer. If additional binder is considered desirable or necessary after the material is spread and shaped, it shall be furnished and applied in the amount directed by the Engineer. Such binder material shall be carefully and evenly incorporated with the material in place by scarifying, harrowing, brooming or by other approved methods.

The base course shall be compacted to 95% Proctor Density.

PRIME COAT

Description

This item shall consist of an application of asphaltic material on the completed base course in accordance with these specifications. The prime coat shall be applied at the rate of 0.30 gallons per square yard.

Prime coat shall not be applied when the air temperature is below 60 degrees F. and falling, but it may be applied when the air temperature is above 50 degrees F. and is rising, the temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.

Materials

The asphaltic material used for the prime coat shall be MC-1 and when tested by approved laboratory methods shall meet the requirements of the Item "Asphalt, Oils, and Emulsions".

Construction Methods

When, in the opinion of the Engineer, the base is satisfactory to receive the prime coat, the surface shall be cleaned by sweeping or other approved methods. If found necessary by the Engineer, the surface shall be lightly sprinkled just prior to application of the asphaltic material. The asphaltic material shall be applied to the cleaned base by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two distributor loads.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times, and they shall be operated in such manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times. The distributor shall have been recently calibrated and the Engineer shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, should the yield on the asphaltic material applied appear to be in error, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding with the work.

The Engineer will select the temperature of application and the Contractor shall apply the asphaltic material at a temperature within 15 degrees F. of the temperature selected. Any asphaltic material heated above 350 degrees F. shall not be used.

The Engineer will select the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended in the Item, "Asphalts, Oils and Emulsions".

The recommended range for the viscosity of the asphalt is 50 seconds to 60 seconds, Saybolt Furol. The Contractor shall apply the asphalt at a temperature within 15 F. of the temperature selected.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer.

No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied prime coat until authorized by the Engineer.

Measurement

The asphaltic material for prime coat will be measured at point of delivery on the road in gallons at the applied temperature. The quantity to be paid for shall be the number of gallons used, as directed, in the accepted prime coat.

Warning to Contractors

Attention is called to the fact that asphaltic materials are very inflammable. The utmost care shall be taken to prevent open flames from coming in contact with the asphaltic material or gas. The Contractor shall be responsible for any fires or accidents which may result from heating the asphaltic materials.

TWO COURSE SURFACE TREATMENT

Description.

This item shall consist of a wearing surface composed of two applications of asphaltic material, each covered with aggregate, constructed on the prepared base course or surface in accordance with these specifications.

Two course surface treatment shall not be applied when the air temperature is below 50 F. and is falling, but it may be applied when the air temperature is above 40 F. and is rising. Air temperature shall be taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.

Materials.

(1) Asphaltic Materials. The asphaltic materials used shall be 120-250 penetration asphalt cement. The Engineer will designate the asphalt penetration to be used.

The asphaltic material specified shall be either a natural homogenous oil or a homogenous residue from oil, shall not have been distilled at a temperature high enough to injure the oil, shall not foam when heated to 347 F., shall be free from water and shall meet the following requirements:

TYPE-GRADE	A.S.S.H.O. OA-175	
	TEST METHOD	MIN. MAX.
Penetration at 77 F., 100g., 5 sec.....	T-49	150 200
Ductility at 77 F., 5cm/min., cms; not less than	T-51	70 -
Flash point, C.O.C., F.....	T-79	450 -
Softening Point, R. & B., F.....	T-53	95 130
Thin Film Oven Test, 1/8 in. Film, 50g., 5 hrs., 325 F. % loss by wt.....		- 1.4
Penetration of Residue at 77 F., 100g., 5 sec. % of Original Pen.....	T-49	40 -
Ductility of Residue at 77 F., 5 cm/min., cms		100 -
Solubility in CCL4, %.....	T-44(1)	99.5
Spot Test on Original OA.....	T-102	Neg.

The asphaltic material shall be delivered in sealed tank cars or trucks and tested and sealed at the point of loading by an approved testing laboratory. The asphaltic material will be accepted by the Engineer only upon receipt of the certificate of test which shows that it conforms to these specifications. The Engineer will inspect and remove all tank seals. The Contractor shall order all asphaltic material and make his own arrangements for delivery and storage; he shall be responsible for its safe and proper storage. All oil used for heating purposes or for operation of equipment shall be kept in tanks separate and apart from asphaltic material.

(2) AGGREGATE. The aggregate used shall be composed of sound and durable particles of gravel or stone. These materials shall be free from organic matter, clays, loam or pebbles coated there with and shall contain not more than 5 percent by weight of any one of or combination of slate, shale, schist, of soft particles of sandstone. The material shall be of a source proven satisfactory for this use. Percent of wear shall not exceed 35 percent (Los Angeles Abrasion Test of Course Aggregate A.A.S.H.O. Designation T-96 with subsequent revisions). Crushed gravel shall have a minimum of 85 percent of the particles retained on a No. 4 sieve with at least one crushed face. When tested by approved laboratory methods, the gradation requirements for the several grades of aggregate shall be as follows:

Grade 4 - Texas Highway Standard Designation Grade No. 4 Type "B" Aggregate

Construction Methods. The area to be treated shall be cleaned of dirt, dust or other deleterious matter by sweeping or other approved methods. If it is found necessary by the Engineer, the surface shall be lightly sprinkled just prior to the first application of asphaltic material.

Asphaltic material of the type and grade shown on the plans for the first course shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly, under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two distributor loads. The distributor shall have been recently calibrated and the Engineer shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, should the yield on the asphaltic material appear to be in error, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding with the work.

No. 4 aggregate shall be immediately and uniformly applied and spread by an approved self-propelled continuous feed aggregate spreader, it shall be leveled and worked with an approved grader or maintainer equipment with belting or kenney brooms attached to mold board in a manner to distribute the aggregate without damage to the work. The aggregate shall be applied at the rates as directed by the Engineer.

The entire first course shall then be broomed, bladed or raked as required by the Engineer and shall be lightly rolled. The Contractor shall be responsible for the maintenance of the first course until the second course is applied.

The second course shall consist of asphaltic material and No. 4 aggregate. The asphaltic material for this second course shall be applied and covered with aggregate in the manner specified for the first application. The surface shall then be broomed, bladed or raked as required by the Engineer and thoroughly rolled with an approved, self-propelled, three-wheel roller weighing not less than 3 tons nor more than 5 tons. Rolling shall be repeated on two successive working days. Rolling unmatted edges and area shall be performed with a pneumatic roller as directed by the Engineer. The rollers shall be operated at speeds not to exceed 30 minutes per 100 lineal feet of pavement. The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer.

After the work has been completed as required by these specifications, there should be a slight excess of aggregate on the surface.

All storage tanks, piping, retorts, booster tanks and distributors used for storing or handling asphaltic material shall be kept clean and in good operating condition at all times; they shall be operated in such manner that there will be no contamination of the asphaltic material with foreign material.

It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The Engineer will select the temperature of application and the Contractor shall apply the asphalt at a temperature within 15 degrees of the temperature selected. Asphalt shall not be heated above 350 deg. F. at any time, and when applied it shall be at a temperature of not less than 275 deg. F. All asphalt heated above 350 deg. F. will be rejected.

The asphalt and aggregate shall be applied at the following rates within 5 percent tolerance as directed by the Engineer.

TWO COURSE SURFACE TREATMENT

Application	Gallons of Asphalt per square yard	Aggregate cubic yds. to square yds.
First	0.35	1/2" 1: 90
Second	0.30	1/2" 1: 90

HOT MIX ASPHALTIC CONCRETE PAVEMENTS

DESCRIPTION. This item shall consist of a base course, a leveling-up course, a surface course or any combination of these courses as shown on the plans, each to be composed of a compacted mixture of mineral aggregate and asphaltic material. The mixture when designed and tested in accordance with these specifications and methods outlined in THD Bulletin C-14, shall have the following laboratory density and stability:

Density, Percent			Stability, Percent
Min.	Max.	Optimum	Not less than 30, unless otherwise shown on plans.
94	99	97	

The pavement shall be constructed on the previously completed and approved subgrade, base, existing pavement, bituminous surface or in the case of a bridge, on the prepared floor slab, as herein specified and in accordance with the details shown on the plans.

Materials

(1) MINERAL AGGREGATE. The mineral aggregate shall be composed of a coarse aggregate, and if required, a mineral filler. Samples of coarse aggregate, fine aggregate and mineral filler shall be submitted in accordance with the methods prescribed in Item 6 of the Standard Specifications, and approval of both material and of the source of supply must be obtained from the Engineer prior to delivery. It shall contain not more than one percent by weight of organic matter clays, loam or pebbles coated therewith as determined by Test Method Tex-217-F. Mineral aggregate from each source shall meet the quality tests specified herein.

The combined mineral aggregate, after final processing by the mixing plant, and prior to addition of asphalt and mineral filler, shall have a sand equivalent value of not less than 45, when subjected to the sand equivalent test as outlined in THD Bulletin C-14.

(a) COARSE AGGREGATE. The coarse aggregate shall be that part of the aggregate retained on a No. 10 sieve; shall consist of clean, tough, durable fragments of stone, crushed blast furnace slag, crushed gravel, gravel or combinations thereof as hereinafter specified, of uniform quality throughout. Coarse aggregate will be tested in accordance with THD Bulletin C-11 (Decantation) and material removed shall not be more than 1 percent. The coarse aggregate shall have an abrasion of not more than 40 percent loss by weight when subjected to the Los Angeles Abrasion Test, Test Method Tex-410-A for all types except Type "F" (Nonskid Surface Course), which shall have an abrasion of not more than 35 percent loss by weight when subjected to the same test. If gravel is used for Type "F", it shall be so crushed that 90 percent of the particles retained on the No. 4 sieve shall have more than one crushed face.

(b) FINE AGGREGATE. The fine aggregate shall be the part of the aggregate passing the No. 10 sieve and shall consist of sand or screenings or a combination of sand and screenings.

Sand shall be composed of durable stone particles free from injurious foreign matter. Screenings shall be of the same or similar material as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested by Test Method Tex-106-E.

(c) MINERAL FILLER. The mineral filler shall consist of thoroughly dry stone dust, slate dust, portland cement or other mineral dust approved by the Engineer. The mineral filler shall be free from foreign and other injurious matter. When tested by the method outlined in THD Bulletin C-14, it shall meet the following grading requirements:

	Percent by Weight
Passing a No. 30 sieve	100
Passing a No. 80 sieve, not less than	90
Passing a No. 200 sieve, not less than	65

(2) ASPHALTIC MATERIAL.

(a) PAVING MIXTURE. Asphalt for the paving mixture shall be of the types of oil asphalt as determined by the Engineer and shall meet the requirements of the Item, "Asphalts, Oils and Emulsions". The grade of asphalt used shall be as designated by the Engineer after design tests have been made using the mineral aggregates that are to be used in the project. If more than one type of asphaltic concrete mixture is specified for the project, only one grade of asphalt will be required for all types of mixtures, unless otherwise shown on plans. The Contractor shall notify the Engineer of the source of his asphaltic material prior to production of the asphaltic mixture and this source shall not be changed during the course of the project except on written permission of the Engineer.

(b) TACK COAT. The asphaltic material for tack coat shall meet the requirements for emulsified asphalt EA-11M, cut-back asphalt RC-2, or shall be a cut-back asphalt made by combining 50 to 70 percent by volume of the asphaltic material as specified for the type of paving mixture with 30 to 50 percent by volume of gasoline and/or kerosene.

PAVING MIXTURES

(1) TYPES. The paving mixtures shall consist of a uniform mixture of coarse aggregate, fine aggregate and asphaltic material. The grading of each constituent of the mineral aggregate shall be such as to produce, when properly proportioned, a mixture, which, when tested in accordance with THD Bulletin C-14, will conform to the limitations for master grading given below for the type specified:

Type "C" (Coarse Graded Surface Course):

Passing 7/8" sieve.....	100
Passing 5/8" sieve.....	95 to 100
Passing 5/8" sieve, retained on 3/8" sieve.....	15 to 40
Passing 3/8" sieve, retained on No. 4 sieve.....	10 to 35
Passing No. 4 sieve, retained on No. 10 sieve.....	10 to 30
Total retained on No. 10 sieve.....	50 to 70
Passing No. 10 sieve, retained on No. 40 sieve.....	0 to 30
Passing No. 40 sieve, retained on No. 80 sieve.....	4 to 25
Passing No. 80 sieve, retained on No. 200 sieve.....	3 to 25
Passing No. 200 sieve.....	0 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight.

Type "D" (Fine Graded Surface Course):

Passing 1/2" sieve	100
Passing 3/8" sieve	95 to 100
Passing 3/8" sieve, retained on No. 4 sieve	20 to 50
Passing No. 4 sieve, retained on No. 10 sieve	10 to 30
Total retained on No. 10 sieve	50 to 70
Passing No. 10 sieve, retained on No. 40 sieve.....	0 to 30
Passing No. 40 sieve, retained on No. 80 sieve.....	4 to 25
Passing No. 80 sieve, retained on No. 200 sieve.....	3 to 25
Passing No. 200 sieve.....	0 to 8

The asphaltic material shall form from 4.0 to 8.0 percent of the mixture by weight.

(2) TOLERANCES. The Engineer will designate the exact grading of the aggregate and asphalt content to be used in the mixture. The paving mixture produced shall not vary from the designated grading and asphalt content by more than the tolerances allowed herein and shall remain within the limitations of the master grading specified. The respective tolerances, based on the percent by weight of the mixture, are listed as follows:

Percent by Weight

Passing 1 3/4" sieve, retained on 7/8" sieve..	plus or minus 4
Passing 7/8" sieve, retained on 3/8" sieve....	plus or minus 4
Passing 5/8" sieve, retained on 3/8" sieve....	plus or minus 4
Passing 3/8" sieve, retained on No. 4 sieve...	plus or minus 4
Passing 1/4" sieve, retained on No. 10 sieve..	plus or minus 4
Passing No. 4 sieve, retained on No. 10 sieve.	plus or minus 4
Total retained on No. 10 sieve.....	plus or minus 4
Passing No. 10 sieve,retained on No. 40 sieve.	plus or minus 3
Passing No. 40 sieve,retained on No. 80 sieve.	plus or minus 3
Passing No. 80 sieve,retained on No.200 sieve.	plus or minus 3
Passing No. 200 sieve.....	plus or minus 2
Asphalt Material.....	plus or minus 0.3

The type and amount of the mixture used shall be as specified on the plans.

(3) EXTRACTION TEST. Samples of the mixture when tested by the Extraction Test, THD Bulletin C-14, shall not vary from the grading proportions of the aggregate and the asphalt content designated by the Engineer by more than the respective tolerances specified above and shall be within the limits specified for master grading.

EQUIPMENT

(1) MIXING PLANTS. Mixing plants that will not continuously produce a mixture meeting all of the requirements of this specification will be condemned.

Mixing plants may be either the weight-batching type or the continuous mixing type. Both types of plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins and dust collectors and shall consist of the following essential pieces of equipment.

(a) Weight-batching Type.

COLD AGGREGATE BIN AND PROPORTIONING DEVICE. The aggregate bin shall have at least four compartments of sufficient size to store the amount of aggregate required to keep the plant in continuous operation and of proper design to prevent overflow of material of one bin to that of another bin. The proportioning device shall be such as will provide a uniform and continuous flow of aggregate in the desired proportion to the dryer. Each aggregate shall be proportioned in a separate compartment.

DRYER. The dryer shall be of the type that continually agitates the aggregate during heating and in which the temperature can be so controlled that aggregate will not be injured in the necessary drying and heating operations required to obtain a mixture of the specified temperature.

The burner, or combination of burners, and type of fuel used shall be such that in the process of heating the aggregate to the desired or specified temperature, no residue from the fuel shall adhere to the heated aggregate, a recording thermometer shall be provided which will record the temperature of the aggregate when it leaves the dryer. The dryer shall be of sufficient size to keep the plant in continuous operation.

SCREENING AND PROPORTIONING. The screening capacity and size of the bins shall be sufficient to screen and store the amount of aggregate required to properly operate the plant and keep the plant in continuous operation at full capacity. Provisions shall be made to enable inspection forces to have easy and safe access to the proper location on the mixing plant where representative samples may be taken from the hot bins for testing. The aggregate shall be separated into at least four bins when producing Type "A", Type "B" and Type "C" mixtures, at least three bins when producing Type "D" mixtures and at least two bins when producing Type "E" and Type "F". If mineral filler is needed an additional bin shall be provided. These bins shall contain the following sizes of aggregates:

Type "C" (Coarse Graded Surface Course):

- Bin No. 1- Will contain aggregate of which 90 to 100 percent by weight will pass the No. 10 sieve.
- Bin No. 2- Will contain aggregates of which at least 85 percent by weight will be of such size as to pass the 1/4 inch sieve and be retained on the No. 10 sieve.
- Bin No. 3- Will contain aggregates of which at least 85 percent by weight will be of such size as to pass the 1/2 inch sieve and be retained on the No. 4 sieve.
- Bin No. 4- Will contain aggregates of which at least 85 percent by weight will be of such size as to pass the 1 inch sieve and be retained on the 3/8 inch sieve.

Type "D" (Fine Graded Surface Course):

- Bin No. 1- Will contain aggregates of which 90 to 100 percent by weight will pass the No. 10 sieve.
- Bin No. 2- Will contain aggregates of which at least 85 percent by weight will be of such size as to pass the 1/4 inch sieve and be retained on the No. 10 sieve.
- Bin No. 3- Will contain aggregates of which at least 85 percent by weight will be of such size as to pass the 1/2 inch sieve and be retained on the No. 4 sieve.

AGGREGATE WEIGH BOX AND BATCHING SCALES. The aggregate weigh box and batching scales shall be of sufficient capacity to hold and weigh a complete batch of aggregate. The weigh box and scales shall conform to the requirements of the Item, "Weighing and Measuring Equipment".

AGGREGATE MATERIAL BUCKET AND SCALES. The asphaltic material bucket and scales shall be of sufficient capacity to hold and weigh the necessary asphaltic material for one batch. If the material is measured by weight, the bucket and scales shall conform to the requirements of the Item, "Weighing and Measuring Equipment".

If a pressure type flow meter is used to measure the asphaltic material, the requirements of the Item, "Weighing and Measuring Equipment" shall apply, and an accurate asphaltic material recording meter shall be placed in the asphalt line leading to the spray bar so that the accumulative amount of asphalt used can be accurately determined.

MIXER. The mixer shall be of the pug mill type and shall have a capacity of not less than 2000 pounds in a single batch. The number of blades and the position of same shall be such as to give a uniform and complete circulation of the batch in the mixer. The mixer shall be equipped with an approved spray bar that will distribute the asphaltic material quickly and uniformly throughout the mixer. Any mixer that has a tendency to segregate the mineral aggregate or fails to secure a thorough and uniform mixing with the asphaltic material shall not be used. This shall be determined by mixing the standard batch for the required time, then dumping the mixture and taking samples from its different parts. This will be tested by the extraction test and must show that the batch is uniform throughout. All mixers shall be provided with an automatic time lock that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent the spilling of aggregate or mixture from the pug mill.

(b) CONTINUOUS MIXING TYPE.

COLD AGGREGATE BIN AND PROPORTIONING DEVICE. Same as for weight-batching type of plant.

DRYER. Same as for weight-batching type of plant.

SCREENING AND PROPORTIONING . Same as for weight-batching type of plant.

HOT AGGREGATE PROPORTIONING DEVICE. The hot aggregate proportioning device shall be so designed that when properly operated a uniform and continuous flow of aggregate into the mixer will be maintained.

ASPHALTIC MATERIAL SPRAY BAR. The asphaltic material spray bar shall be so designed that the asphalt will spray uniformly and continuously into the mixer.

ASPHALTIC MATERIAL METER. An accurate asphaltic material recording meter shall be placed in the asphalt line leading to the spray bar so that the accumulative amount of asphalt used can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the meter output.

MIXER. The mixer shall be of the pug mill continuous type and shall have a capacity of not less than 40 tons of mixture per hour. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing of the aggregate with the asphaltic material shall not be used.

TRUCK SCALES. A set of standard platform truck scales, conforming to the Item, "Weighing and Measuring Equipment", shall be placed at a location approved by the Engineer.

(2) ASPHALTIC MATERIAL HEATING EQUIPMENT. Asphaltic material heating equipment shall be adequate to heat the amount of asphaltic material required to the desired temperature. Asphaltic material may be heated by steam coils which shall be absolutely tight. Direct fire heating of asphaltic materials will be permitted, provided the heater used is manufactured by a reputable concern and there is positive circulation of the asphalt throughout the heater. Agitation with steam or air will not be permitted. The heating apparatus shall be equipped with a recording thermometer with a 24-hour chart that will record the temperature of the asphaltic material where it is at the highest temperature.

(3) SPREADING AND FINISHING MACHINE. The spreading and finishing machine shall be of a type approved by the Engineer and shall be capable of producing a surface that will meet the requirements of the typical cross section and the surface test.

(4) FORMS. The use of forms will not be required except where necessary to support the edges of the pavement during rolling. If the pavement will stand rolling without undue movement, binder twine or small rope may be used to align the edges.

(5) MOTOR GRADER. The motor grader, if used, shall be a self-propelled power motor grader; it shall be equipped with smooth tread pneumatic tired wheels; shall have a blade length of not less than 12 feet; shall have a wheel base of not less than 16 feet; and shall be tight and in good operating condition and approved by the Engineer.

(6) PNEUMATIC TIRE ROLLERS. The rollers shall be an acceptable medium pneumatic tire roller conforming to the requirements of the Item, "Rolling (Pneumatic Tire)", Type B, unless otherwise specified on plans.

The tire pressure of each tire shall be adjusted as directed by the Engineer and this pressure shall not vary by more than 5 pounds per square inch.

(7) TWO AXLE TANDEM ROLLER. This roller shall be an acceptable power driven tandem roller weighing not less than 8 tons.

(8) THREE WHEEL ROLLER. This roller shall be an acceptable power driven three wheel roller weighing not less than 10 tons.

(9) THREE AXLE TANDEM ROLLER. This roller shall be an acceptable power driven three axle roller weighing not less than 10 tons.

(10) TRENCH ROLLER. This roller shall be an acceptable power driven trench roller equipped with sprinkler for keeping the wheels wet and adjustable road wheel so that roller may be kept level during rolling. The drive wheel shall be not less than 20 inches wide.

(11) STRAIGHTEDGES AND TEMPLATES. The Contractor shall provide acceptable 16 foot straightedges for surface testing. Satisfactory templates shall be provided as required by the Engineer.

(12) All equipment shall be maintained in good repair and operating condition and shall be approved by the Engineer.

STOCKPILING, STORAGE, PROPORTIONING AND MIXING

(1) STOCKPILING OF AGGREGATES. Prior to stockpiling of aggregates the area shall be cleaned of trash, weeds and grass and be relatively smooth. Aggregates shall be stockpiled in such a manner as to prevent mixing of one aggregate with another. Coarse aggregates for Types "A", "B" and "C" shall be separated into at least two stockpiles of different gradation, such as a large coarse aggregate, and a small coarse aggregate stockpile and such that the grading requirements of the specified type will be met when the piles are combined in the asphaltic mixture. No coarse aggregate stockpile shall contain more than 15 percent by weight of material that will pass a No. 10 sieve except as noted on the plans or provided for by special provision. Fine aggregate stockpiles may contain small coarse aggregate in the amount of up to 20 percent by weight, 100 percent of which shall pass a 1/4 inch sieve, however, the coarse aggregate shall meet the quality tests specified herein for "Coarse Aggregates". Suitable equipment of acceptable size shall be furnished by the Contractor to work the stockpiles and prevent segregation of the aggregates.

(2) STORAGE AND HEATING OF ASPHALTIC MATERIALS. The asphaltic material storage shall be ample to meet the requirements of the plant. Asphalt shall not be heated to a temperature in excess of 400 F.. All equipment used in the storage and handling of asphaltic material shall be kept in a clean condition at all times and shall be operated in such manner that there will be no contamination with foreign matter.

(3) FEEDING AND DRYING OF AGGREGATE. The feeding of various sizes of aggregate to the dryer shall be done through the cold aggregate bin and proportioning device in such a manner that a uniform and constant flow of materials in the required proportions will be maintained. The aggregate shall be dried and heated to the temperature necessary to produce a mixture having the specified temperature. In no case shall the aggregate be introduced into the mixing unit at a temperature more than 400 F..

(4) PROPORTIONING. The proportioning of the various materials entering into the asphaltic mixture shall be as directed by the Engineer and in accordance with these specifications. Aggregate shall be proportioned by weight using the weigh box and batching scales herein specified when the weigh-batch type of plant is used and by volume using the hot aggregate proportioning device when the continuous mixer type of plant is used. The asphaltic material shall be proportioned by weight or by volume based on weight using the specified equipment.

(5) MIXING.

(a) BATCH TYPE MIXER. In the charging of the weigh box and in the charging of the mixer firm the weigh box, such methods or devices shall be used as are necessary to secure a uniform asphaltic mixture. In introducing the batch into the mixer, all mineral aggregate shall be introduced first; shall be mixed thoroughly for a period of 5 to 20 seconds, as directed, to uniformly distribute the various sizes throughout the batch before the asphaltic material is added; the asphaltic material shall then be added and the mixing continued for a total mixing period of not less than 30 seconds. This mixing period may be increased, if, in the opinion of the Engineer, the mixture is not uniform.

(b) CONTINUOUS TYPE MIXER. The amount of aggregate and asphaltic material entering the mixer and the rate of travel through the mixer shall be so coordinated that a uniform mixture of the specified grading and asphalt content will be produced.

(c) The Mixture produced from each type of mixer shall not vary from the specified mixture by more than the tolerances herein specified.

(d) The asphaltic mixture shall be at a temperature between 225 F. and 350 F. when dumped from the mixer. The Engineer will determine the temperature, within the above limitations, and the mixture when dumped from the mixer shall not vary from this selected temperature more than 25 F.

CONSTRUCTION METHODS

The prime coat, tack coat or the asphaltic mixture when placed with a spreading and finishing machine, shall not be placed when the air temperature is below 50 F. and is falling, but it may be placed when the air temperature is above 40 F. and is rising. The asphaltic mixture when placed with a motor grader, shall not be placed when the air temperature is below 60 F. and is falling, but may be placed when the air temperature is above 50 F. and is rising. The air temperature shall be taken in the shade away from artificial heat. It is further provided that the prime coat, tack coat or asphaltic mixture shall be placed only when the humidity, general weather conditions and temperature and moisture condition of the base, in the opinion of the Engineer, are suitable.

(1) PRIME COAT. If a prime coat is required, it shall be applied and paid for as a separate item conforming to the requirements of the Item, "Prime Coat", except the application temperature shall be as provided above. The tack coat or asphaltic concrete shall not be applied on a previously primed flexible base until the prime base has completely cured to the satisfaction of the Engineer.

(2) TACK COAT. Before the asphaltic mixture is laid, the surface upon which the tack coat is to be placed shall be cleaned thoroughly to the satisfaction of the Engineer. The surface shall be given a uniform application of tack coat under asphaltic materials of this specification. This tack coat shall be applied, as directed by the Engineer, with an approved sprayer at a rate of not to exceed 0.10 gallon per square yard of surface. Where the mixture will adhere to the surface on which it is to be placed without the use of a tack coat, the tack coat may be eliminated by the Engineer. All contact surfaces of curbs and structures and all joints shall be painted with a thin uniform coat of the asphaltic material used for the tack coat. The tack coat shall be rolled with a pneumatic as directed by the Engineer.

(3) TRANSPORTING ASPHALTIC CONCRETE. The asphaltic mixture, prepared as specified above, shall be hauled to the work in tight vehicles previously cleaned of all foreign material. The dispatching of the vehicles shall be arranged so that all material delivered may be placed, and all rolling shall be completed during daylight hours. In cool weather or for long hauls, canvas covers and insulating of the truck bodies may be required. The inside of the truck body may be given a light coating of oil, if necessary, to prevent mixture from adhering to the body.

(4) PLACING.

(a) Generally the asphaltic mixture shall be dumped and spread on the approved prepared surface with the specified spreading and finishing machine, in such manner that when properly compacted the finished pavement will be smooth, of uniform density and will meet the requirements of the typical cross sections and the surface tests. During the application of asphaltic material, care shall be taken to prevent splattering of adjacent pavement, curb and gutter, and structures.

(b) In placing a level-up course with the spreading and finishing machine in the forms, binder twine or cord, shall be set to line and grade established by the Engineer. When directed by the Engineer, level-up courses shall be spread with the specified motor grader.

(c) When the asphaltic mixture is placed in a narrow strip along the edge of an existing pavement, or used to level up small areas of an existing pavement or placed in small irregular areas where the use of a finishing machine is not practical, the finishing machine may be eliminated when authorized by the Engineer, provided a satisfactory surface can be obtained by other approved methods.

(d) FLUSH STRUCTURES. Adjacent to flush curbs, gutters, liners and structures, the surface shall be finished uniformly high so that when compacted it will be slightly above the edge of the curb and flush structure.

(5) COMPACTING.

(a) As directed by the Engineer, the pavement shall be compressed thoroughly and uniformly with the specified rollers.

(b) Rolling with the three wheel and tandem rollers shall start longitudinally at the sides and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the rear wheels. Alternate trips of the roller shall be slightly different in length. On superelevated curves, rolling shall begin at the low side and progress toward the high side. Rolling with pneumatic roller shall be done as directed by the Engineer. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. One tandem roller, one pneumatic roller and at least one three wheel roller, as specified above shall be provided for each job. If the Contractor elects he may substitute the three axle tandem roller for the two axle tandem roller and/or the three wheel roller; but in no case shall less than three rollers be in use on each job. Additional rollers shall be provided if needed. The motion of the roller shall be slow enough at all times to avoid displacement of the mixture.

If any displacement occurs, it shall be corrected at once by the use of rakes and of fresh mixture where required. The roller shall not be allowed to stand on pavement which has not been fully compacted. To prevent adhesion of the surface mixture to the roller, the wheels shall be kept thoroughly moistened with water, but an excess of water will not be permitted. All rollers must be in good mechanical condition. Necessary precautions shall be taken to prevent the dropping of gasoline, oil, grease or other foreign matter on the pavement, either when the rollers are in operation or when standing.

(c) HAND TAMPING. The edges of the pavement along curbs, headers and similar structures, and all places not accessible to the roller, or in such positions as will not allow thorough compaction with the roller, shall be thoroughly compacted with lightly oiled tamps.

(d) Rolling with the trench type roller will be required on widening areas in trenches and other limited areas where satisfactory compaction cannot be obtained with the three wheel and tandem rollers.

(6) SURFACE TESTS. The surface of the pavement, after compression, shall be smooth and true to the established line, grade and cross section, and when tested with a 16-foot straightedge placed parallel to the centerline of the roadway, it shall have no deviation in excess of 1/16 inch per foot from the nearest point of contact. The maximum ordinate measured from the face of the straightedge shall not exceed 1/4 inch at any point. Any point in the surface not meeting these requirements shall be immediately corrected.

(7) OPENING TO TRAFFIC. The pavement shall be opened to traffic when directed by the Engineer. All construction traffic allowed on the pavement shall comply with the State laws governing traffic on highways.

CONCRETE

SCOPE. The work under this section includes furnishing materials and equipment and performing necessary work to do concrete work shown on the drawings or incidental to the proper execution of the work, as hereinafter specified or as directed by the Engineer.

COMPOSITION. Concrete shall be composed of cement, fine aggregate, coarse aggregate, water and approved cement dispersing agent (Pozzolite or equal) so proportioned and mixed as to produce a plastic, workable mixture in accordance with all requirements under this section and suitable to the specific conditions of placement.

CLASSIFICATION. Except where required to meet special conditions, all concrete shall be Class "A", Class "B", or Class "C" as designated for the various parts of the work in accordance with the conditions of application and the proportions of materials and the strengths required. In general, Class "A" concrete shall be used for liquid storage tanks; Class "B" for all other reinforced concrete work and Class "C" for unreinforced footings, piers and walls.

STRENGTH. The mixes will be designed to secure concrete having the following compressive strength at the age of 28 days, as determined by breaking standard six (6) inch diameter by twelve (12) inch height test specimens in accordance with the procedure set forth in A.S.T.M. Designations C31-38 and C39-33.

Class	Minimum Average for and 5 consecutive cylinders	Minimum for any one cylinder
A	3750 lbs. per sq. inch	3000 lbs. per sq. inch
B	2500 lbs. per sq. inch	2000 lbs. per sq. inch
C	2000 lbs. per sq. inch	1600 lbs. per sq. inch

HIGH-EARLY STRENGTH CONCRETE. High-early strength concrete made with high-early strength Portland cement or other special cements shall be used only when specifically authorized by the Engineer. The 7-day compressive strength of concrete of any class, when made with high-early strength cement, shall be at least equal to the specified minimum 28-day compressive strengths for that class. All provisions of these specifications, except for cement, shall be applicable to such concrete. High-early strength cement shall be approved by the Engineer before use.

CEMENT.

(1) PORTLAND CEMENT. Portland shall conform to Federal Specifications SS-C-19 lb., or ASIM C-9, except as specified in sub-paragraph (2) below.

(2) HIGH-EARLY STRENGTH-PORTLAND CEMENT. Cement for high-early strength concrete shall conform to Federal Specification SS-C-201, or A.S.T.M. C-74.

(3) SPECIAL TEST REQUIREMENTS. Cement shall be tested by a recognized testing laboratory or agency satisfactory to the Engineer. Samples to be tested shall be taken at the mill. The Contractor shall arrange and pay for the testing and shall furnish the Engineer certified copies of all test reports. No cement shall be used until notice has been given by the Engineer that the test results are satisfactory. Cement which has been stored for more than four (4) months after being tested shall be retested by the Contractor at his own expense before use. Ordinarily, no cement shall be used until after it has satisfactorily passed both the 7-day and 28-day tests, but in cases of emergency the Engineer may waive the 28-day tests and permit the use of cement which has satisfactorily passed the soundness and 7-day test, provided it is

the product of a quarry and mill having and established reputation for the production of high-grade cement.

FINE AGGREGATE.

- (1) COMPOSITION- Fine aggregate shall be natural sand.
- (2) Fine aggregate shall consist of hard, strong, durable and uncoated particles.
- (3) GRADING- The grading shall conform to the following requirements.

Total Retained	Percent by Weight
3/8" screen.....	0
1/4" screen.....	0-5
20 mesh sieve.....	15-50
100 mesh sieve.....	85-100

- (4) DELETERIOUS SUBSTANCES- The substances designated below shall not be present in excess of the following amounts

	Percent by Weight
Clay lumps.....	0.5
Material removed by decantation from aggregates not more than.....	3.0
Other deleterious substances such as coal, shale, coated grains and soft flaky particles.....	2.0

- (5) MORTAR STRENGTH- Mortar specimens made one (1) part cement to three (3) parts of the fine aggregate shall have a compressive strength at 28 days of at least ninety (90) percent of the strength of similar specimens made with Ottawa sand having a fineness modulus of 2.40/0.10.

- (6) TESTS- When given ASTM C-40 test for organic impurities the color shall not be darker than the standard. Mineral filler may be added to sand if approved by the Engineer.

COARSE AGGREGATE:

- (1) COMPOSITION- Coarse aggregate shall be gravel or crushed stone suitably prepared.

- (2) Quality- Coarse aggregate shall consist of hard, tough and durable particles free from adherent coating. It shall contain no vegetable matter nor soft, friable, thin or elongated particles in quantities considered deleterious by the Engineer. The substances designated shall not be present in excess of the following amount by weight:

Deleterious substance including friable, thin, elongated or laminated pieces.....	3.0%
---	------

Soft fragments..... 3.0%
 Clay lumps..... 1/4%
 Removed by decantation..... 1%
 The sum of all deleterious ingredients
 exclusive of that removed by decantation
 shall not exceed..... 5%

When the material removed by decantation consists essentially of crusher dirt, the maximum amount permitted may be raised to 1-1/2 percent. Aggregate which has disintegrated or weathered badly under exposure conditions similar to these which will be encountered by the work under consideration, shall not be used. When crushed stone is used the crusher shall be equipped with a screening system which will entirely separate the sut from the stone and convey it to a separate bin.

(3) SIZE- Coarse aggregate shall be well graded from fine to coarse so that concrete of the required workability, density, and strength, can be made without the use of an excess amount of sand, water or cement.

When tested by approved methods, the coarse aggregate shall conform to the following grading requirements:

Concrete	Percent retained by weight on following screens (round openings)						
	1/4"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2-1/2"
Class "A"	95-100	25-75		0-5			
Class "B"	95-100		25 to 60			0 to 5	
Class "C"	95-100		45 to 75		25 to 60		0-5

(4) Tests- Where the concrete in the finished work will be exposed to contact with aggressive soils or waters, or other destructive agents as determined by the Engineer, the coarse aggregate shall be subjected to the sodium sulphate acceleraed soundness test in accordance with A.S.T.M. designation aggregate. However, aggregate failing to pass this test may be used with the approval of the Engineer, provided it has given satisfactory service for a period of not less than five (5) years under exposure to conditions similar to those to which it will be subjected in the proposed work.

WATER. The water used in mixing concrete shall be fresh, clean, and free from injurious amounts of oil, acid, alkali or organic matter.

STORAGE.

(1) CEMENT- Immediately upon receipt, at the site of the work, cement shall be stored in a thoroughly dry, weather-tight, and properly ventilated building or barge, with adequate provisions for the prevention of the absorpction of moisture. Storage shall be such as to permit easy access for inspection and difinite identification of each shipment.

(2) AGGREGATE- The fine aggregate and such size of the coarse aggregate shall be stored separately and in such manner as to be free to drain and to avoid the inclusion of any foreign material in the concrete. Stock piles of coarse aggregates shall be built in horizontal layers to avoid segregation. Aggregates shall be protected from freezing and the inclusion of frost, and heating of aggregates may be required as directed by the Engineer when concreting is performed in cold weather.

PROPORTIONING.

(1) CONTROL- The exact proportions of all material entering into the concrete shall be as directed by the Engineer. The Contractor shall provide all equipment necessary positively to determine and control the actual amounts of all materials entering into the concrete. The proportions will be changed whenever in the opinion of the Engineer, such change becomes necessary to obtain the specified strength and the desired durability, density, uniformity, and workability; and Contractor will not be compensated because of such changes, except that he will be compensated for an increase in the specified minimum unit cement content as stated in subparagraph (3) below when such increase is authorized by the Engineer.

(2) MEASUREMENT- All materials shall be measured by weight or volume as directed by the Engineer. One (1) bag of cement will be considered as 94 pounds in weight, or one (1) cubic foot loose, in volume, and one (1) gallon of water as 8.33 pounds.

(3) CEMENT CONTENT- Each cubic yard of concrete shall contain not less than the quantity of cement stated below:

Class "A"	3.5 bags or 317 pounds
Class "B"	3.0 bags or 470 pounds
Class "C"	4.5 bags or 423 pounds

(4) WATER CONTENT- In calculating the total water content in any mix, the amount of moisture carried on the surface of the aggregate particles shall be included. The total water content per bag of cement for each batch of concrete shall not exceed the following:

Class "A"	6.0 gallons or 50.0 pounds
Class "B"	7.25 gallons or 60.4 pounds
Class "C"	8.0 gallons or 66.6 pounds

In all cases, however, the amount of water to be used shall be the minimum amount necessary to produce a plastic mixture of the strength specified and of the desired density, uniformity and workability. In general, the consistency of any mix shall be that required for the specific placing conditions and methods of placement, and ordinarily the slump shall be between 1-1/2 inches and 4-1/2 inches, and in no case less than 1 inch nor more than 6

inches, when tested in accordance with the current specifications for "Method of Test for Consistency of Portland Cement Concrete," of the American Society for Testing Materials.

An increase in the maximum water content to improve workability will not be permitted unless comparative tests under job conditions show conclusively that such increase in water content will not result in a decrease in concrete strength and durability and provided further that such increase does not exceed one (1) gallon per cubic yard.

(5) AGGREGATE CONTENT- The total volume of aggregates to be used in each cubic yard of concrete shall be that necessary to produce a dense mixture of the required workability as determined by the Engineer.

(6) Admixtures may be used only with the approval of the Engineer.

MIXING AND PLACING.

(1) EQUIPMENT- The Contractor shall operate one or more approved batch-type mixing plants. The rating capacity of any individual mixer shall be 1/2 cubic yard or more. The mixing plant or plants may be located either at the site of the work or at any other point approved by the Engineer. The plant or plants shall be provided with adequate equipment and facilities for accurate measurement and control of all materials and water, and for readily changing the proportion to conform to the varying conditions of the work, in order to produce concrete of the required uniform strength and workability. The plant or plants shall include provisions to facilitate the inspection of all operations at all times and shall be subject to the approval of the Engineer.

(2) READY-MIXED CONCRETE- At the option of the Contractor, ready-mixed concrete may be used in lieu of concrete mixed at the job. All mixing requirements specified herein for concrete mixed at the site shall be enforced and the Engineer shall have free access to the mixing plant at all times.

(3) TIME- The minimum time for mixing each batch, after all materials are in the mixer, shall be 1-1/2 minutes. The mixer shall revolve a minimum of 12 revolutions after all materials have been placed therein, and at a uniform speed. Neither the speed nor the volume capacity of the mixer shall exceed those recommended by the manufacturer. Excessive overmixing, requiring additions of water to preserve the required consistency, will not be permitted.

(4) CONVEYING- Concrete shall be conveyed from mixer to forms as rapidly as practicable and by methods which will prevent segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position. Chutes, if permitted, shall have a slope of less than 1 on 2. Where a vertical drop

greater than 5 feet is necessary, placement shall be through elephant trunks or similar devices to prevent segregation.

(5) PLACING- Concrete shall be placed before initial set has occurred, and in no event after it has contained its water content for more than 30 minutes. Unless otherwise specified, all concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated fills, but never upon soft mud or dry porous earth. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures in such a manner as to prevent segregation of the coarse aggregate. Construction of forms for the lifts of vertical walls shall be such as to make all parts of the walls easily accessible for the placement, spading and consolidation of the concrete as specified herein.

(6) VIBRATION- All concrete shall be placed with the aid of mechanical vibrating equipment as approved by the Engineer. Vibration shall be transmitted directly to the concrete, and in no case shall it be transmitted through the forms. The duration of vibration at any location in the forms shall be held to the minimum necessary to produce thorough compaction.

(7) FINISH- All top surfaces, other than slabs, not covered by forms and which are not to be covered by additional concrete or fill shall receive a wood float finish without additional mortar. Care shall be taken that no excess water is present when this finish is made. Other surfaces shall be brought to finish elevations and left true and regular.

(8) CONSTRUCTION JOINTS- Construction joints shall be formed as indicated in the drawings or as approved or directed by the Engineer. Where indicated or required, dowel rods shall be used. All concrete at the joint shall have been in place not less than 12 hours, and longer if so directed by the Engineer, before concrete resting thereon is placed. Before placing is resumed, or commenced, all excessive water and laitance shall be removed and the concrete shall be cut away, where necessary, to insure a strong dense concrete at the joint. In order to secure adequate bond the surface of the concrete already in place shall be cleaned and roughened and shall then be spread with a 1/2 inch layer of mortar of the same cement-sand ratio as is used in the concrete, immediately before the new concrete is deposited.

CURING AND PROTECTING.

(1) CURING- All concrete shall be kept wet for a period of 7 days unless otherwise specifically prescribed by the Engineer, by covering with water, an approved water-saturated covering, or other approved method which will keep all surfaces continuously wet.

(2) MEMBRANE CURING- When, in the opinion of the Engineer, satisfactory results can be obtained by membrane curing, permission will be given to the Contractor to substitute an approved curing compound for the water curing specified. If a curing compound is used it shall be applied in 2 coats and it shall be of such composition that it will adhere to fresh, damp concrete and form a thoroughly bonded, dense, continuous, water-tight membrane which will not run or sag and will dry satisfactorily within 3 hours after application. The coverage shall not exceed 300 square foot per gallon per coat and shall be applied in a uniform coat with approved pressure-spraying equipment. The compound used shall contain at least 30 percent of non-volatile solids. Samples consisting of at least one gallon, of any compound proposed for use shall be sent to a laboratory designated by the Engineer, if required, at least 30 days previous to application of the compound. When curing compound is used on surfaces to which new concrete is to be bonded, any compound film remaining at the expiration of the curing period shall be carefully removed by sand blasting or the adequate use of steel wire brooms or brushes.

(3) PROTECTION FROM THE SUN- All concrete shall be adequately protected from injurious action of the sun in a manner satisfactory to the Engineer.

(4) PROTECTION IN COLD AND FREEZING WEATHER- In cold weather concrete shall be mixed and placed only when the temperature is at least 40 F. and rising, unless permission for placement of concrete is obtained from the Engineer. In which event, all materials shall be heated in a manner approved by the Engineer. In freezing weather, suitable means shall be provided for maintaining the concrete at a temperature of at least 50 F. for not less than 72 hours after placing, or until the concrete has thoroughly hardened. The methods of heating the materials and protecting the concrete shall be subject to approval of the Engineer. Salt, chemicals, or other foreign materials shall not be mixed with the concrete for the purpose of preventing freezing.

FORMS.

(1) MATERIALS- Forms shall be of wood, steel or other approved material. All exposed surfaces shall be constructed with forms lined with plyboard, masonite, steel or other smooth material specifically approved. Surfaces not exposed may be formed with tongue-and-groove lumber or lined forms as mentioned above. The type, size, shape, quality and strength of all materials of which the forms are made shall be subject to the approval of the Engineer.

(2) CONSTRUCTION- Forms shall be built true to line and grade, and shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports. Responsibility for their adequacy shall rest with the Contractor.

Form surfaces shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. Bolts and rods used for internal ties shall be so arranged that, when the forms are removed, all metal will be not less than 2 inches from any concrete surface. Wire ties will not be permitted where objectionable. All forms will be so constructed that they can be removed without hammering or prying against the concrete. Unless otherwise indicated, suitable mouldings shall be placed to bevel or round exposed edges, at expansion joints and any other points as may be required by the Engineer.

(3) COATING- Forms, other than those having absorptive form lining for exposed surfaces, shall be coated with a non-staining mineral oil which shall be applied shortly before the concrete is placed. Forms for unexposed surfaces may be thoroughly wetted in lieu of oiling, immediately before the placing of concrete, except that in freezing weather oil shall be used.

(4) REMOVAL- Forms shall not be removed without the approval of the Engineer, and all removal shall be accomplished in such manner as will prevent injury to the concrete. Forms shall not be removed before the expiration of the minimum number of days indicated below, except when specifically authorized by the Engineer. When, in the opinion of the Engineer, conditions on the work are such as to justify it, forms may be required to remain in place for longer or shorter periods.

Beam and slabs	10 days
Columns and piers	7 days
Walls and vertical faces	2 days

REINFORCEMENT.

(1) GENERAL. The Contractor shall furnish and install all reinforcement, including rods, fabric and structural shapes, as indicated on the plans or otherwise required. All bar reinforcement shall be open hearth new billet steel of structural, intermediate, or hard grade or shall be rail steel concrete reinforcement.

Billet steel shall conform to applicable ASTM Designation A-15.

Rail steel reinforcement shall conform to applicable ASTM Designation A-16 (bars produced by the piling method not acceptable) or the reinforcement may conform to the requirements of Federal Specifications QQ-B-71a, and Amendment 1, dated December, 1940. Unless otherwise indicated, all bars shall be Type "B" (deformed), Grade 2, 3, 4, or 5 wire mesh. All welded wire fabric reinforcement shall conform to ASTM Designation A-185-37. All reinforcement shall be when surrounding concrete is placed, entirely free from rust, scale, grease, or other coating which might destroy or reduce its bond with concrete. Shop drawings, lists and placing details shall be furnished by the Contractor when required.

(2) MINIMUM SPACING OF RODS. The clear distance between parallel rods shall be not less than 1-1/2 times the diameter of round rods, or twice the side dimensions of square rods, and unless specified authorized, shall in no case be less than 1 inch. Splices may be tied together if 45 diameters lap is provided.

(3) PROTECTIVE COVERING.

(a) All main reinforcement in sewer conduits, culverts, wall and column footings and similar structures, embedded in earth or submerged in water shall be placed not less than 3 inches from any concrete surface, unless otherwise set forth.

(b) All main reinforcement in beams, slabs, and walls or culverts and bridges, and similar structures of comparatively thin sections, exposed to the weather shall be placed not less than 2 inches from any concrete surface, unless otherwise set forth.

(c) All main reinforcement in walls and slabs of buildings exposed to the weather and in fire-resistant construction, shall be placed not less than 1 inch from the surface in walls and slabs, one and one-half inches in floor beams, and 2 inches in girders and columns. In interior flat slab construction, the minimum cover may be reduced to 3/4 inch. For interior work where fire hazard does not exist, the main reinforcement shall be placed not less than 3/4 inch from the surface in walls and slabs, 1 inch on floor beams and 1-1/2 inches in girders and columns.

(d) The covering of stirrups, spacer-rods, and similar secondary reinforcement may be reduced by the diameter of such rods. The above dimensions shall be measured from the face of the reinforcement to the face of the forms.

(4) SPLICING- Where splices in reinforcement in addition to these indicated are necessary, there shall be sufficient lap to transfer the stress by bond, as may be directed. Rods shall be lapped not less than 40 diameters and splices shall be staggered.

The lapped end of rods shall be separated sufficiently or connected properly to develop the full strength of the rod. Adjacent sheets of mesh reinforcement shall be spliced by lapping not less than 6 inches, the lapped ends being securely wired together.

(5) SUPPORTS- All reinforcement shall be secured in place true to the lines and grades indicated, by the use of metal or concrete supports, spacers or ties as approved by the Engineer. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concreting operation, and shall be used in such a manner that they will not be exposed on the face of, nor in any way discolor or be noticeable in the surface of finished concrete. The costs of furnishing and placing all supports, spacers, ties and/or other devices required, shall be included in the contract prices for the various types of reinforcement specified.

(6) PROTECTION FOR FUTURE USE. Exposed reinforcement intended for bonding with future work shall be protected from corrosion by heavy wrapping of burlap saturated with bituminous material.

EMBEDDED ITEMS. Before placing concrete, care shall be taken to determine that any embedded metal or wood parts are firmly and securely fastened in place as indicated. They shall be thoroughly clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood in concrete shall be avoided whenever possible, metal being used instead. If wood is allowed, it shall be thoroughly wetted before the concrete is placed.

EXPANSION AND CONTRACTION JOINTS. Expansion and contraction joints shall be constructed at such points and of such dimensions as may be indicated on the drawings or required by the Engineer. The method and materials used shall be subject to the approval of the Engineer. Unless otherwise indicated in the drawings, or required by the Engineer, expansion joints shall be made by the use of and approved pre-moulded mastic expansion joint fill of 1/2 inch in thickness and of width as shown on the drawings.

(1) ASPHALT MASTIC STRIPS- (Preformed) shall be composed of approximately 75% asphalt, 15% fiber and 10% mineral matter.

(2) MASTIC FOR POURED JOINTS- Mastic for poured joints shall be composed of refined asphaltic pyrobitumen and natural asphalt bitumens, with or without suitable plasticizers, and a volatile solvent, containing at least 2 percent inert filler and show no tendency to separate.

(3) COPPER DIAPHRAMS- Copper diaphragms for construction joints shall be 16 ounces per square foot unless otherwise shown, all subject to the approval of the Engineer.

ESTIMATING STORM WATER RUNOFF

GENERAL

Estimating runoff is the process of determining the volume or peak rate of runoff, from a given watershed for the design storm (or frequency of storm), or the safe yield expected from the watershed.

FACTORS AFFECTING SURFACE RUNOFF

There are numerous factors affecting surface runoff but the principal factors are as follows:

1. PRECIPITATION - Rate of rainfall (intensity) and duration of rainfall.
2. ANTECEDENT MOISTURE CONDITIONS - principally the amount of precipitation occurring in the five days preceding the storm in question.
3. SOIL TYPE - from low runoff soils of sand and gravel to high runoff soils of clay.
4. VEGETATIVE COVER - type of foliage including grass, weeds, crops, trees, etc.
5. CONSERVATION PRACTICES - contouring and terracing practices.
6. TOPOGRAPHY - slope of watershed.

NORMAL METHODS OF CALCULATING RUNOFF

There are numerous methods (all estimates) in computing expected runoff. Probably the most universally used and the oldest is the Rational Method where the formula for runoff (Q) is expressed as follows:

$$Q = CIA$$

Where Q = runoff in cubic feet per second

C = Coefficient of runoff depending on slope, etc., usually ranging from 0.2 to 0.9

I = Intensity of rainfall expressed in inches per hour

A = Area of watershed in acres

1. Coefficient of runoff (C)

The imperviousness of the area is logically compensated for by assuming a coefficient representing the proportion of the rainfall that does not soak into the ground or remain behind but goes to make up the peak flood discharge.

Typical "C" factors are as follows:

Type of Surface	Coefficient
Paved surfaces-----	0.85 - 0.95
Roofs-----	0.75 - 0.85
Macadamized streets-----	0.30 - 0.75
Gravel roadways and walks-----	0.20 - 0.50
Lawns, gardens, parks, etc.-----	0.10 - 0.40
 Types of Drainage Area	
Mostly densely built-up areas-----	0.70 - 0.90
Well built-up, few open areas-----	0.50 - 0.75
Residential areas, detached houses-----	0.25 - 0.50
Suburban areas, few buildings-----	0.10 - 0.40

2. Intensity of Rainfall (I)

The intensity of rainfall is the average rate of rainfall in inches per hour occurring during the time of concentration (T) it takes for the most remote part of the drainage area to reach the point in study and thus begin contributing to the overall runoff.

The Texas State Highway Department uses the formula $I = B/(t+d)e$ to calculate the rainfall intensity amount.

The following nomograph solves this formula for I for areas within Randall County.

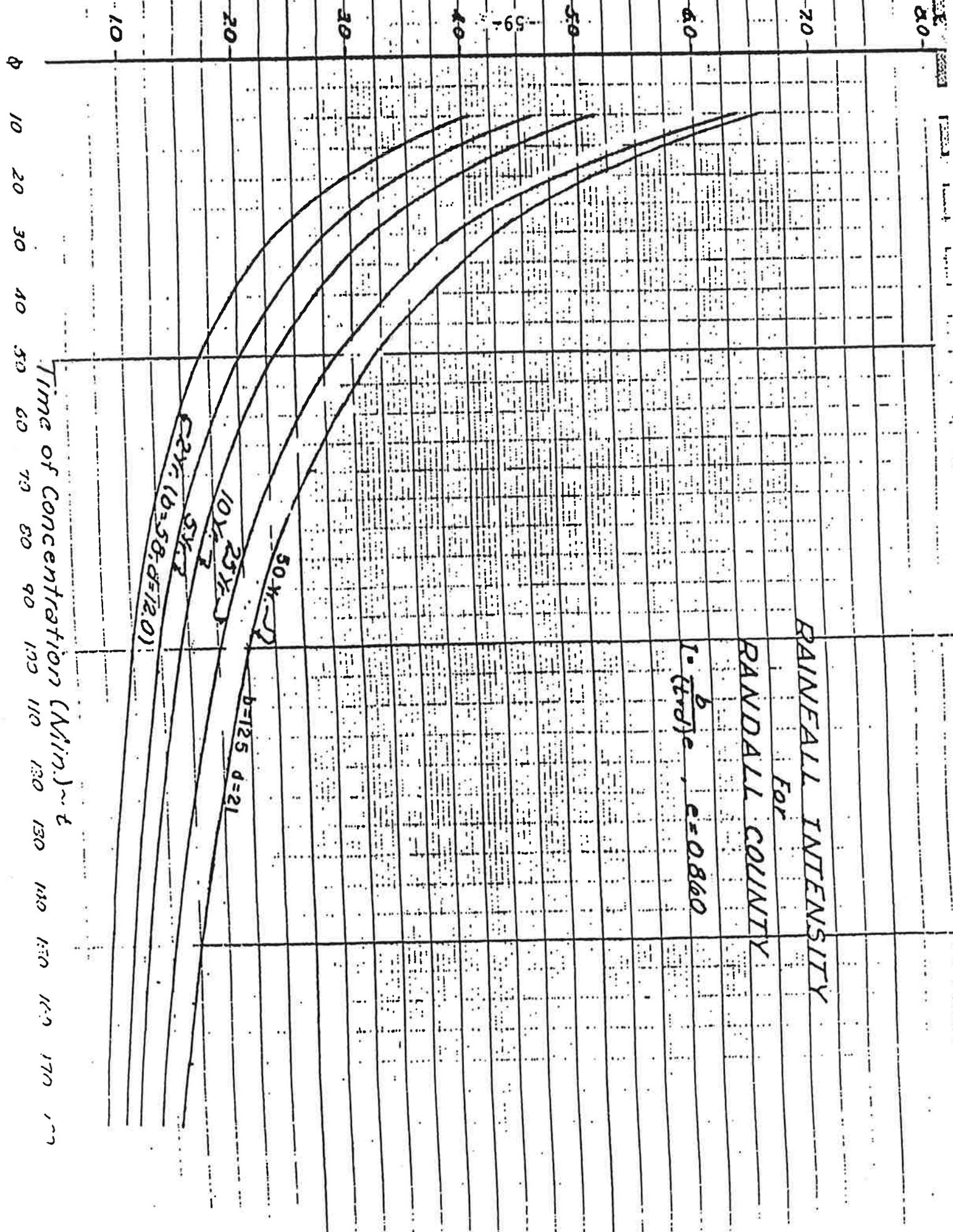
RAINFALL INTENSITY
FOR
RANDALL COUNTY

$$I = \frac{b}{(t+d)^c} \quad c = 0.860$$

$$b = 125 \quad d = 21$$

50%
25%
10%
5%
2%
(2% (b=58, c=12.0))

Time of Concentration (Min.) ~ t



SOIL CONSERVATION SERVICE METHOD OF COMPUTING RUNOFF

Another method often used in calculating estimated runoff is based using charts developed for certain ground slopes, soil types, and vegetation cover as developed by the Soil Conservation Service.

1. SLOPE FACTOR- The slope factors are divided into three divisions.

Flat-	0 to 3% slope
Moderate-	3 to 8%
Steep-	8% and over

Since most development area in Randall County will be on flat slope (0-3%) then we use this slope factor in the nomograph to follow.

2. SOIL GROUPS- In Randall County the soil groups vary greatly but the rural area generally subject to development is between Amarillo and Canyon. These soil groups are generally in the hydrologic group "D" but of course will vary depending upon specific location.

3. VEGETATION COVER AND USE- Most of the land for development has been rural cultivated land with varying degrees of conservation practices and some pasture land in good to fair condition.

4. RATES OF RAINFALL EXPECTED- For Randall County the weather bureau data shows the following peak rainfalls are expected in 24-hour time period for the various design frequencies.

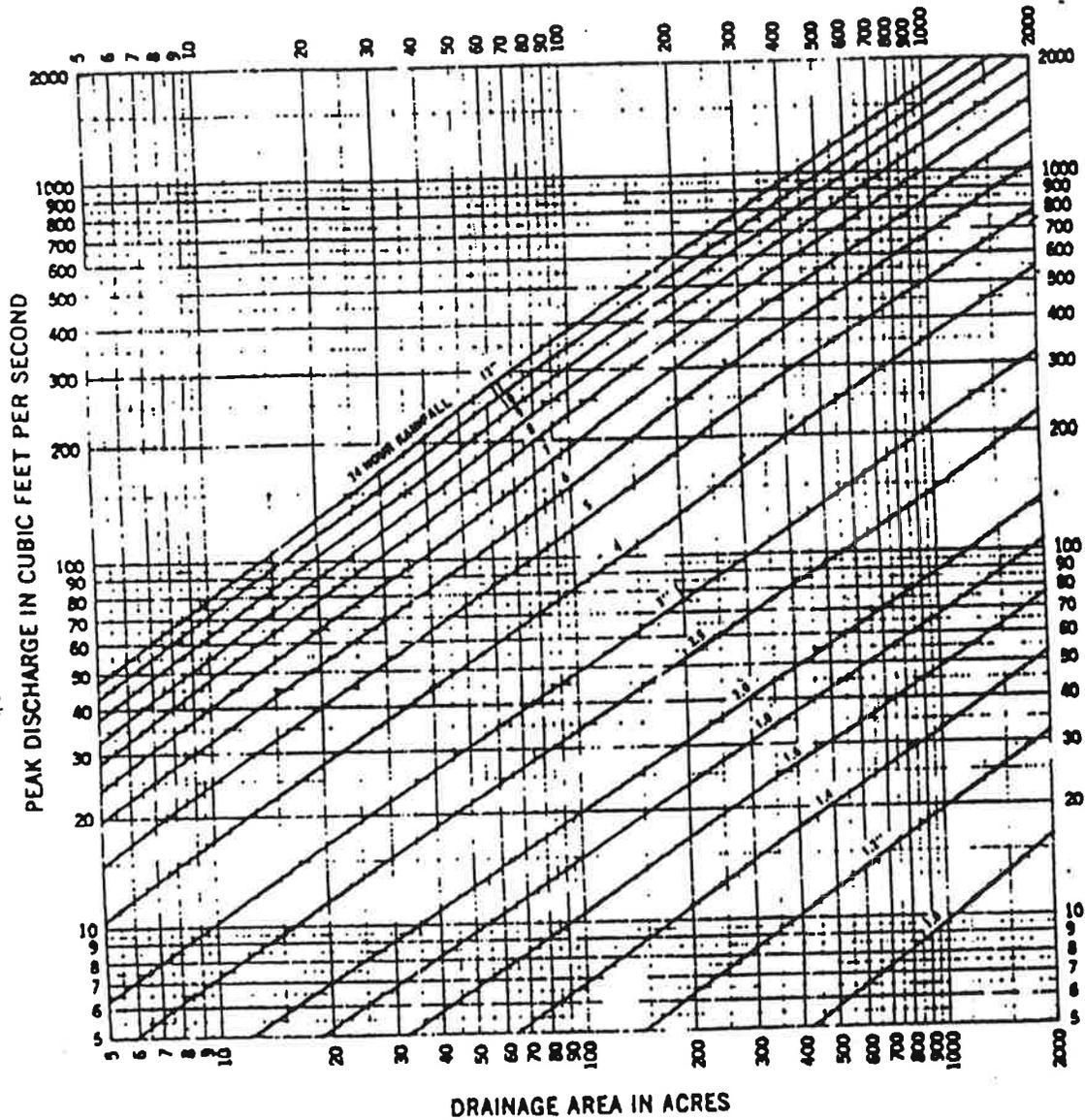
Frequencies	Peak Rainfall Expected
2 years	2.75 inches
5 years	3.75 inches
10 years	4.50 inches
25 years	5.20 inches
50 years	5.60 inches
100 years	6.60 inches

5. CURVE NUMBER- Using a flat slope factor, soil group "D", and cultivated land with varied conservation treatment a curve number of 80 is often used. Following is a nomograph solving this runoff (peak discharge) for various rates of rainfall in 24 hours based upon curve number 80.

PEAK RATES OF DISCHARGE FOR SMALL WATERSHEDS TYPE II STORM DISTRIBUTION

SLOPES - FLAT
CURVE NUMBER - 80

24 HOUR RAINFALL FROM US WB TP-40



REFERENCE

Chapter 2, Engineering Field Manual
for Conservation Practices

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ENGINEERING DIVISION - HYDROLOGY BRANCH

GRADES

STORM SEWER - CONCRETE PIPE

<u>MINIMUM GRADES</u>					<u>MAXIMUM GRADES AND VOLUMES</u>	
(Suggested Minimum 3.0 fps)					(Suggested 10 fps)	
	Area SF	At 3.0 fps Velocity	Minimum		Maximum	
			Q in cfs	Slope	Q Allowed @ 10'/Sec	Slope
18"	1.7671	3.0	5.28 cfs	0.181%	17.67 cfs	2.028%
24"	3.1416	3.0	9.42 cfs	0.124%	31.42 cfs	1.382%
30"	4.9087	3.0	14.94 cfs	0.095%	49.09 cfs	1.026%
36"	7.0686	3.0	21.21 cfs	0.072%	70.69 cfs	0.804%
42"	9.6211	3.0	28.86 cfs	0.058%	96.21 cfs	0.655%
48"	12.5664	3.0	37.70 cfs	0.049%	125.66 cfs	0.548%
54"	15.9043	3.0	47.83 cfs	0.042%	159.04 cfs	0.468%
60"	19.6350	3.0	58.91 cfs	0.036%	196.35 cfs	0.407%
72"	28.2743	3.0	84.82 cfs	0.028%	282.74 cfs	0.319%
84"	38.4845	3.0	115.45 cfs	0.023%	384.85 cfs	0.259%
96"	50.2655	3.0	150.80 cfs	0.019%	502.66 cfs	0.217%

Chezy-Manning Equation for flow in pipes

$$Q = \frac{(1.485 \pi / 4)}{n^{2/3}} \times D^{8/3} S^{1/2}$$

With n = 0.11

$$Q = 42.077 D^{2.667} S^{0.5}$$

Storm Sewer Flow Capacity n = .011 concrete pipe Using Chezy-Fanning equation for pipe flow

$$Q = \frac{1.485 \pi/4 \times D^{8/3} S^{1/2}}{(2/3)^n} \quad Q = \text{cfs, } D = \text{diameter in feet, } S = \text{slope in feet/foot with } n = 0.011$$

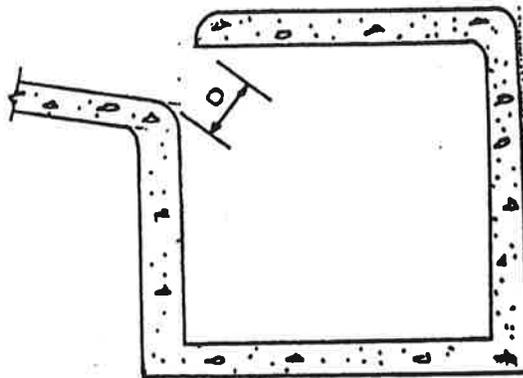
$$Q = 42.077 D^{2.667} S^{0.5} = \text{cfs}$$

Size	0.10%	0.15%	0.20%	0.25%	0.30%	0.40%	0.50%	0.60%	0.80%	1.00%
18"		5.54	6.20	7.84	8.77	9.61	11.09	12.40		
24"	10.34	11.95	13.36	14.63	16.90	20.69	23.90	26.72		
30"	18.76	21.67	24.22	26.54	30.64	34.26	37.53	43.34	48.45	
36"	24.91	30.51	35.24	39.40	43.16	49.83	55.72	61.03	70.48	
42"	37.59	46.03	53.16	59.43	65.10	75.18	84.05	92.07		
48"	53.67	65.73	75.90	84.86	92.96	107.34	120.01			
54"	73.47	89.99	103.91	116.18	127.26	146.95				
60"	97.31	119.19	137.62	153.87	168.56	194.63				
72"	158.26	193.82	223.81	250.23	274.11					
84"	238.73	292.39	337.62	377.47						
96"	340.86	417.47	482.05							

Storm sewers should be designed for 3' per second minimum velocity and 10' per second maximum velocity.

INLET CAPACITY
THROUGH CURB-TYPE INLETS
FOR STORM FLOW

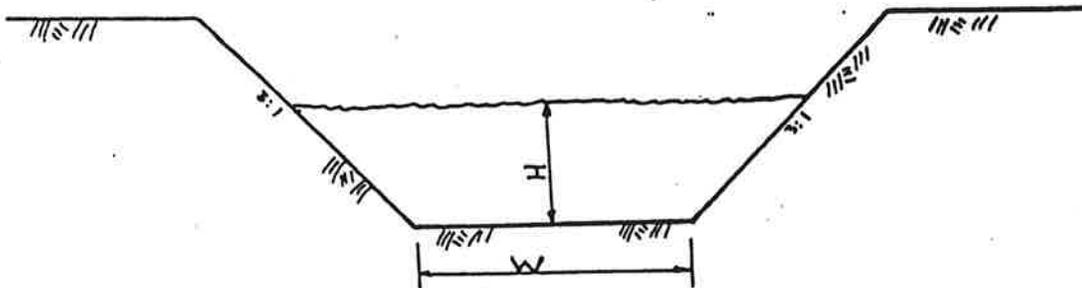
D = Flow in CFS Per Lineal Foot	
2"	0.2
3"	0.4
4"	0.6
5"	0.82
6"	1.1
8"	1.67



FLOW IN TRAPEZOIDAL CHANNELS

Design Formula $Q = A \times \frac{1.486}{n} \times R^{2/3} \times S^{1/2} = AV$

<u>Q</u> CFS	<u>W</u> Feet	<u>H</u> Feet	<u>S</u> Ft/Ft	<u>n*</u> Coefficient
255	8	3.0	.002	.02
280	10	3.8	.001	.02
310	10	4.0	.001	.02
291	10	3.0	.002	.02
450	14	4.0	.001	.02

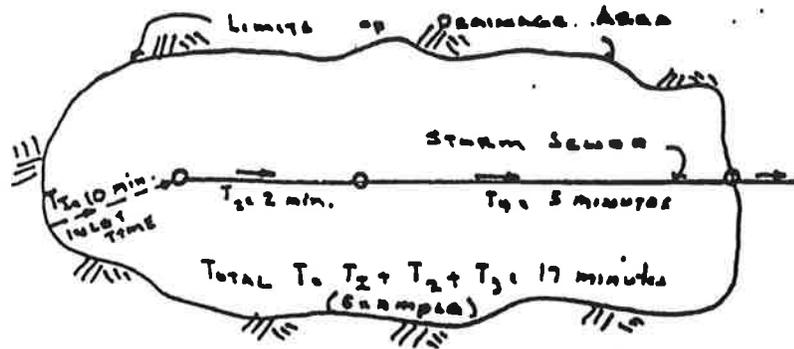


* COEFFICIENT OF ROUGHNESS n FOR CHANNELS

<u>Type of Lining</u>	<u>n(Manning)</u>
Ordinary earth, smoothly graded-----	.02
Sod, depth of flow over 6 in. -----	.04
Sod, depth of flow under 6 in. -----	.06
Type A riprap, rough -----	.04
Concrete paved gutter -----	.016

SOLVING TIME OF CONCENTRATION FOR STORM SEWER DESIGN

Typical Example



Using Seelye's Formula $T = 0.16 I^{1/2} S^{-1/3} D^{1/2}$

Where:

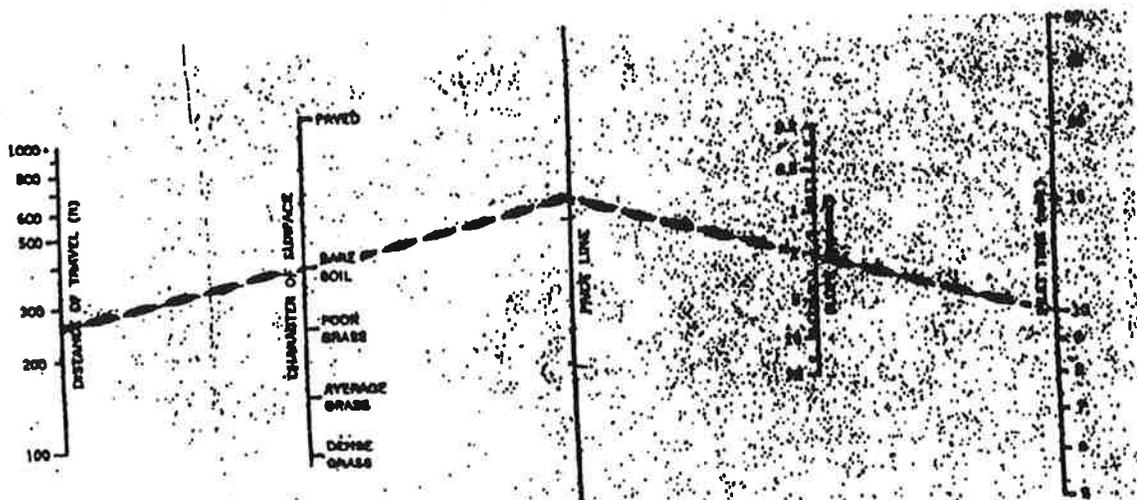
T = Inlet Time in Minutes

I = Runoff Coefficient

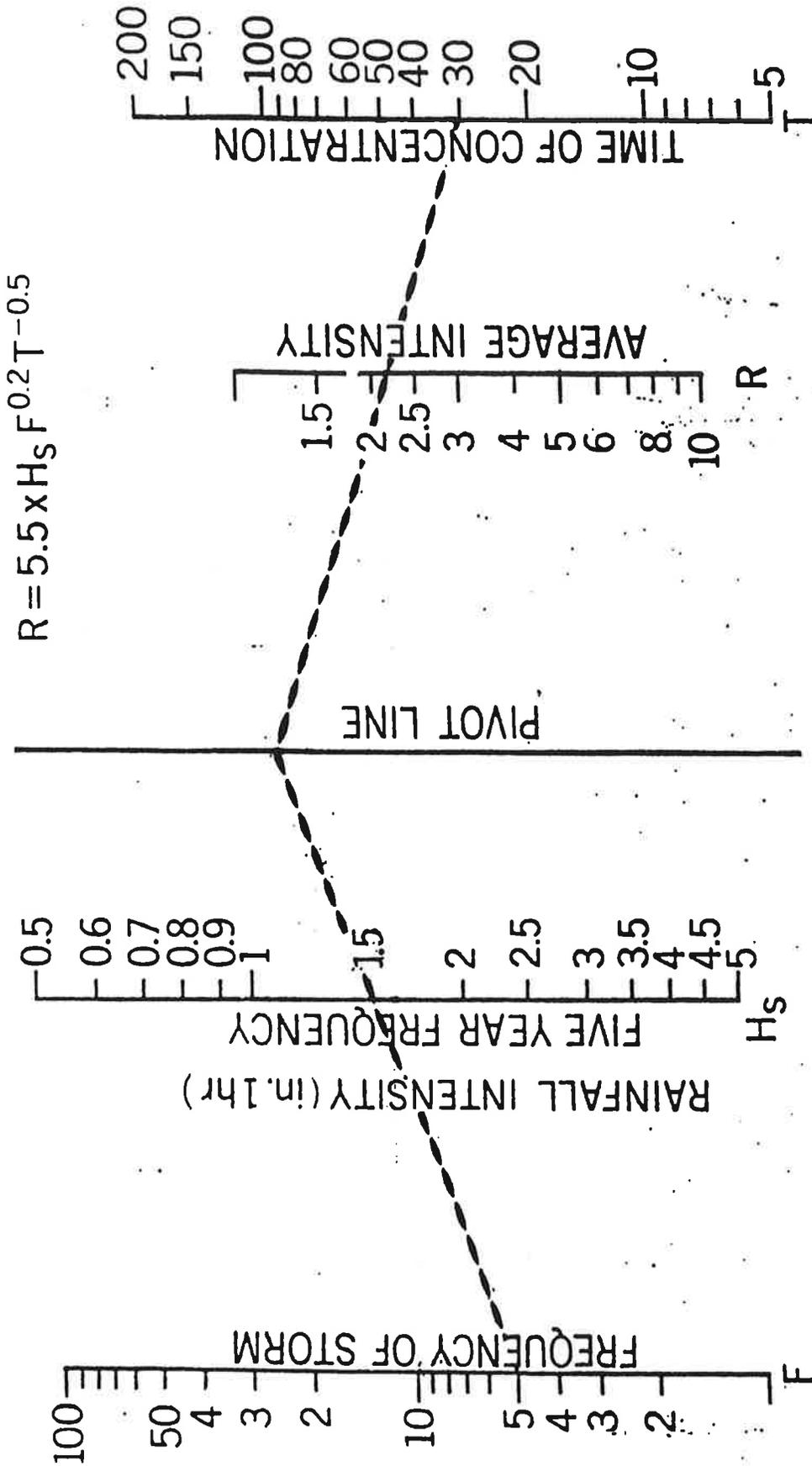
S = Average Slope of Ground in feet per foot

D = Distance of Travel in Feet

Or solve Seelye's Formula by Nomograph below:



rational formula



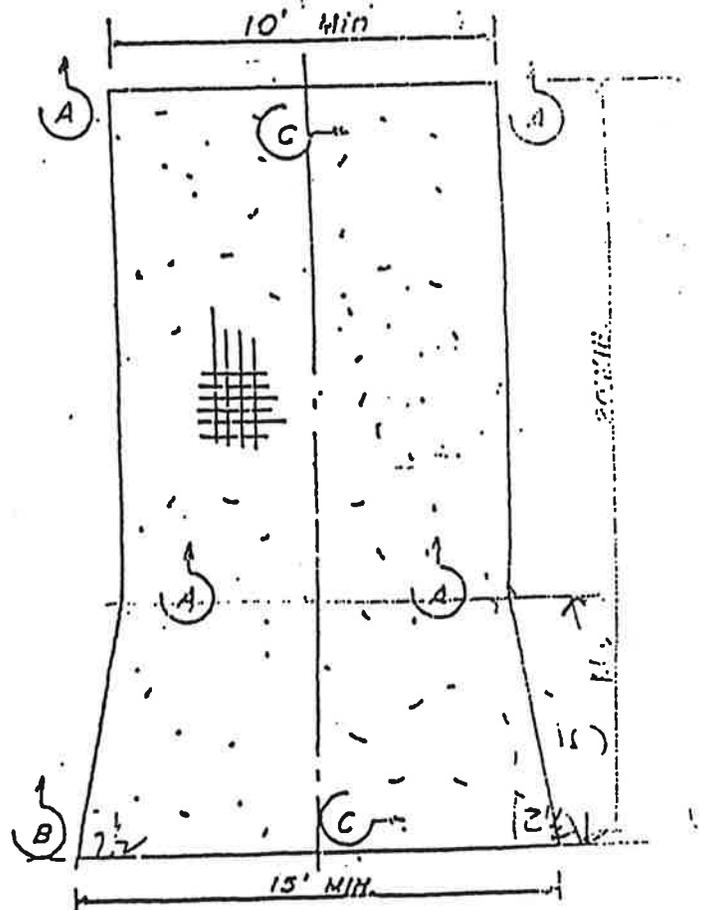
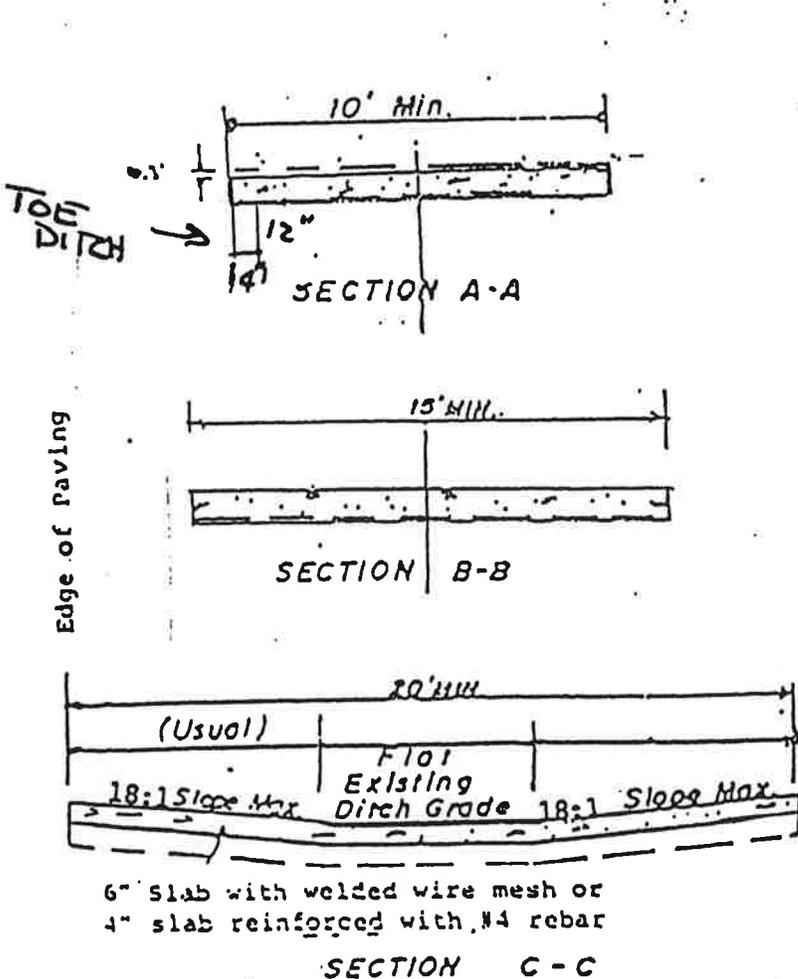
$$R = 5.5 \times H_s \times F^{0.2} \times T^{-0.5}$$

NOMOGRAM TO SOLVE THE FORMULA $R = 5.5 \times H_s \times F^{0.2} \times T^{-0.5}$

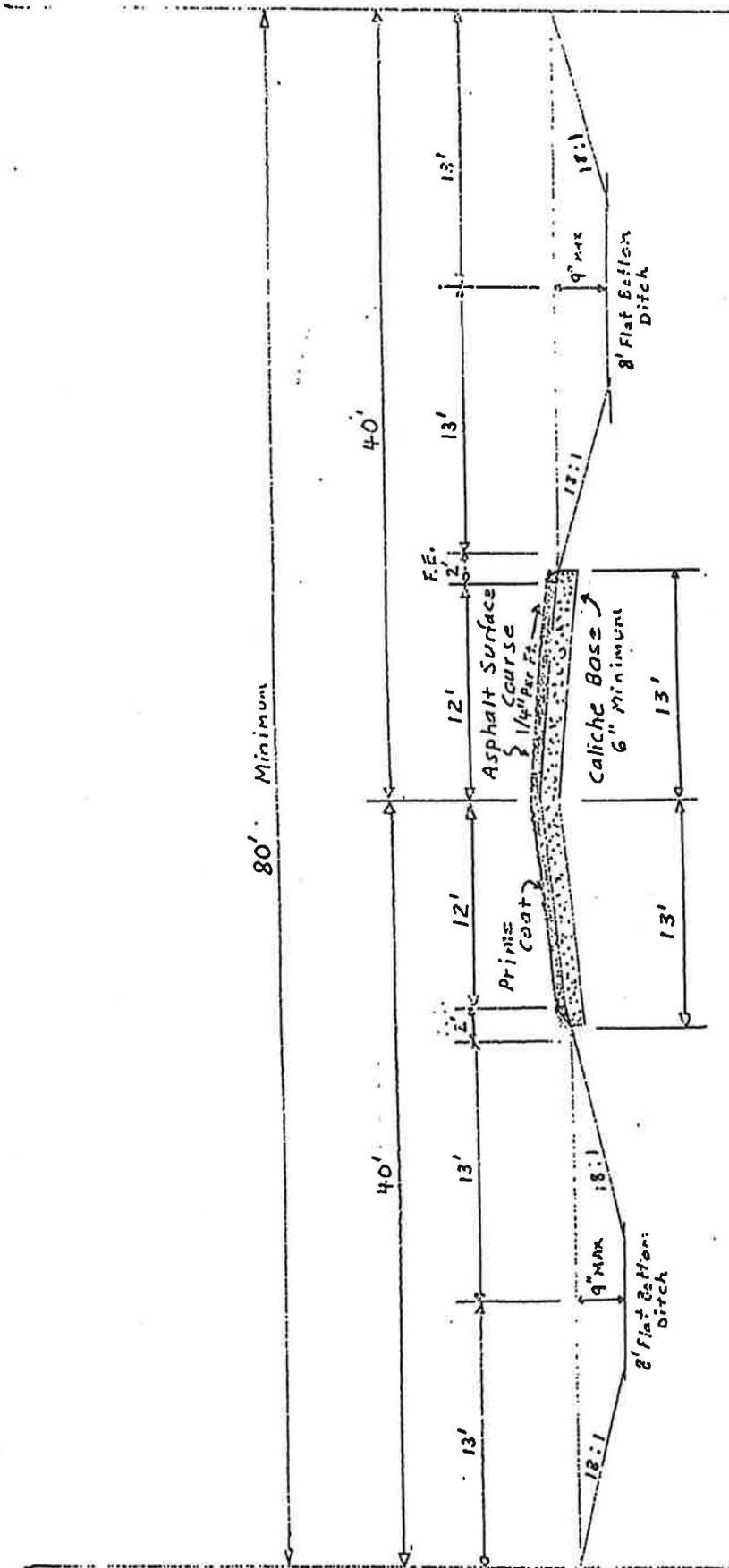
SPECIFICATIONS FOR PRIVATE DRIVEWAYS

The following specifications shall apply to the construction of any private driveway within the unincorporated area of Randall County.

1. Concrete driveway shall extend from the edge of the existing pavement to a minimum of 20 feet through the drainage ditch.
2. Edge of concrete driveway shall be flush with the edge of the existing pavement.
3. Concrete shall be Class A, (3,000 psi minimum), 6" with welded wire or 4" thick with #4 rebar on 18" c.c.
4. All concrete shall be reinforced with 6 x 6 #6 welded wire mesh or with #4 rebar on 18" c.c. Mesh or rebar shall be extend from radius to radius and shall be kept at a minimum of 2" from bottom of valley while concrete is being poured.
5. Flowline of driveway shall be no higher than the grade of the existing ditch.
6. Grade across driveway at flowline shall be 0.3' (minimum).
7. Width of driveway shall be a minimum of 10 feet and 15 feet at the edge of paving.
8. Concrete driveway to have toe-in on down stream side, 4" width, 18" depth.

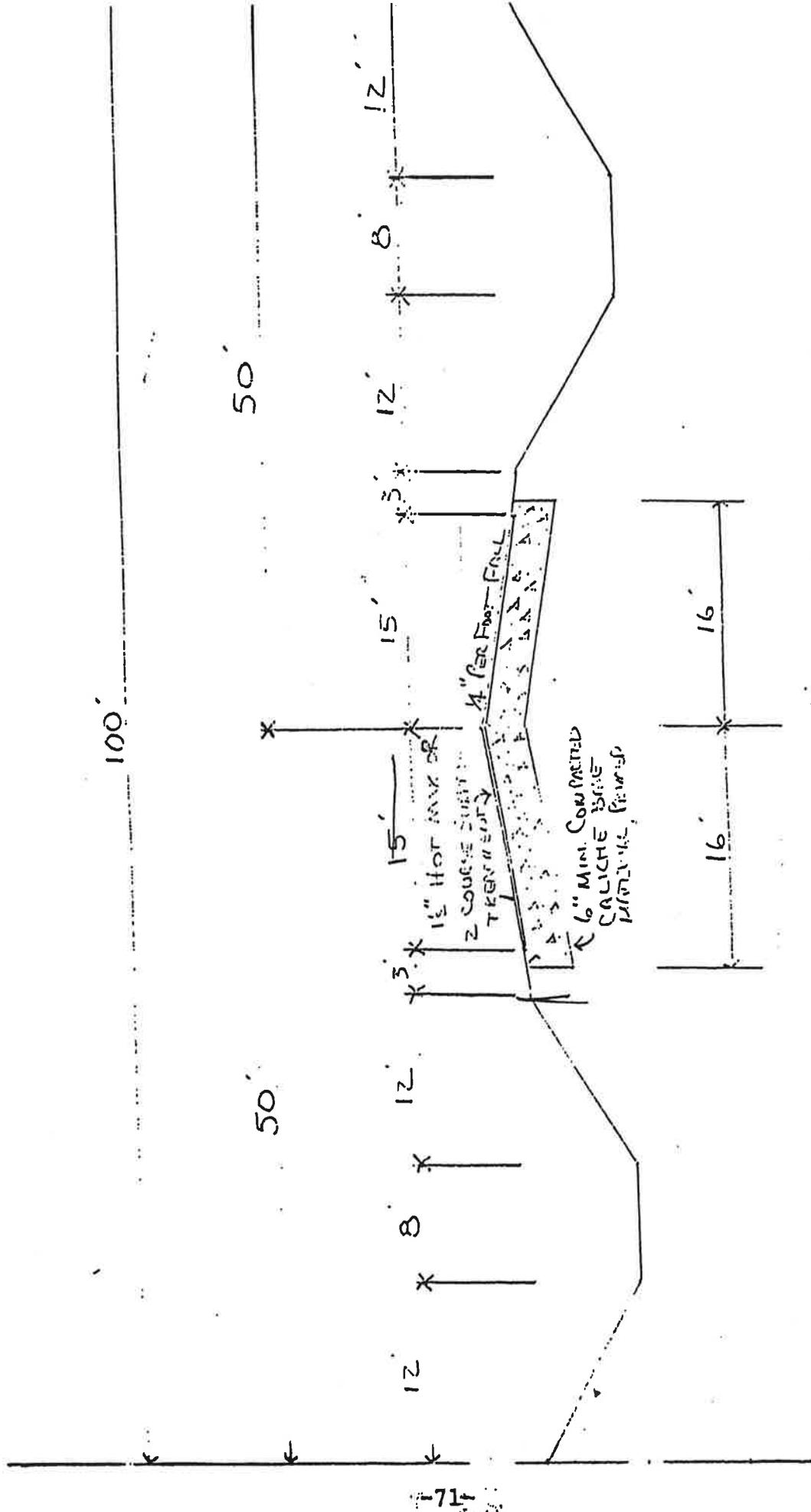


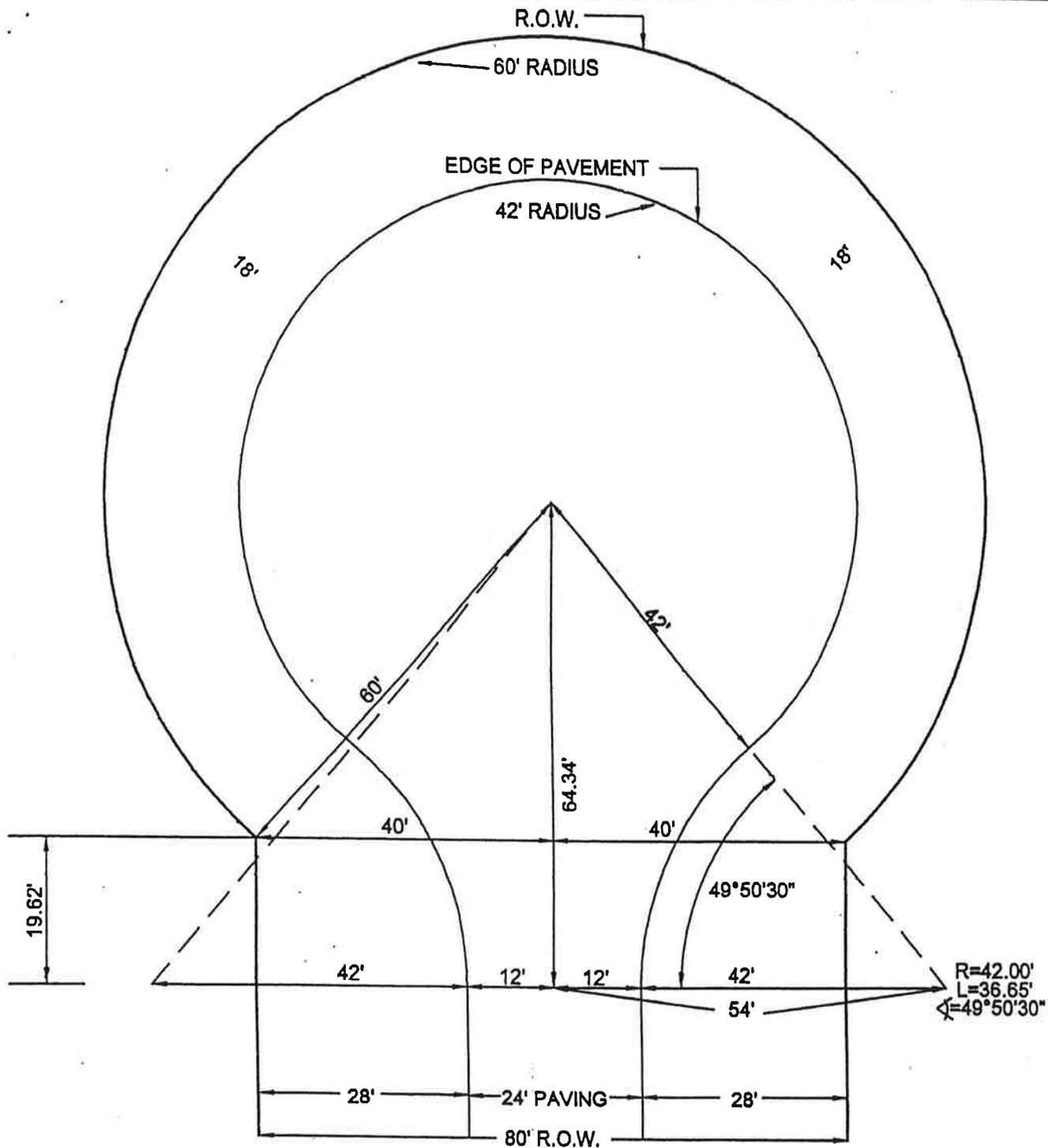
DRIVEWAY STANDARD
RANDALL COUNTY



TYPICAL SECTION
SHOWING 80' RIGHT OF WAY

Note: The maximum depth of the drainage ditches when building the subgrade is 18:1, 6" in depth. The additional 3" is allowed for building the shoulder after completion of the paving.





STANDARD CUL-DE-SAC

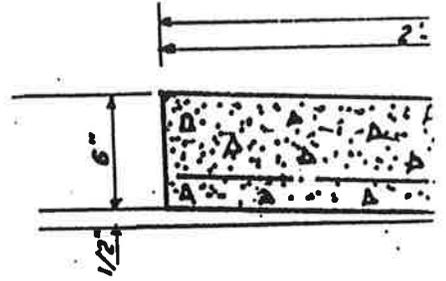
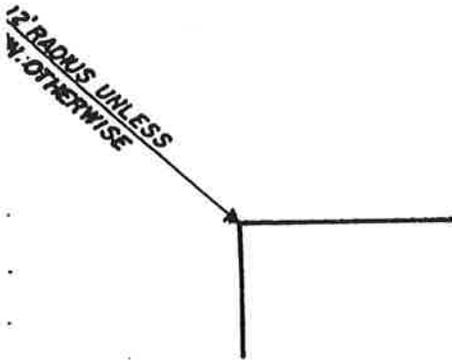
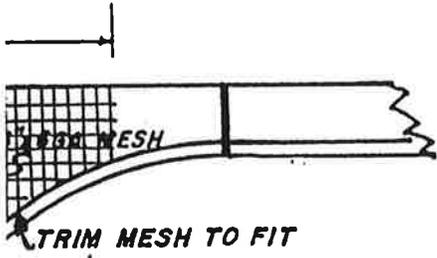
THOMAS-ISRAEL CONSULTING ENGINEERS

4005 BUSINESS PARK DR.
 AMARILLO, TEXAS 79110
 FAX (806) 358-4820
 (806) 358-4829
 E-MAIL tengaur@wtccoxmail.com

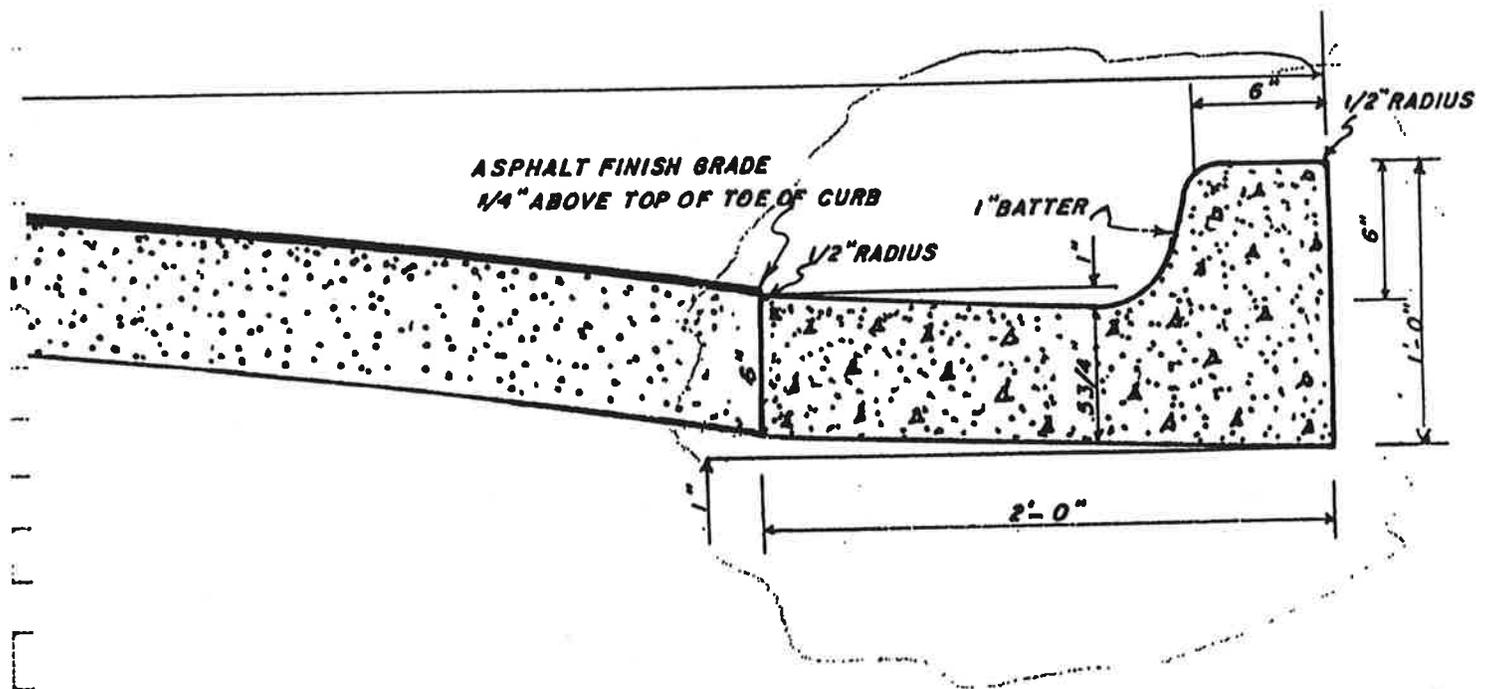
SCALE: 1"=20'

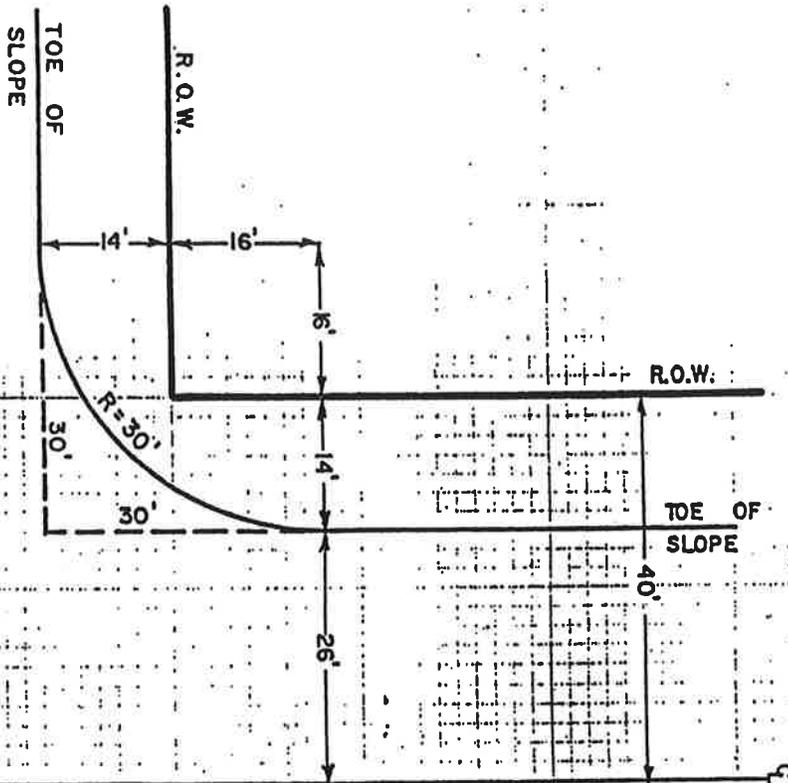
DATE: 9/30/04

REVISED:



SECTION





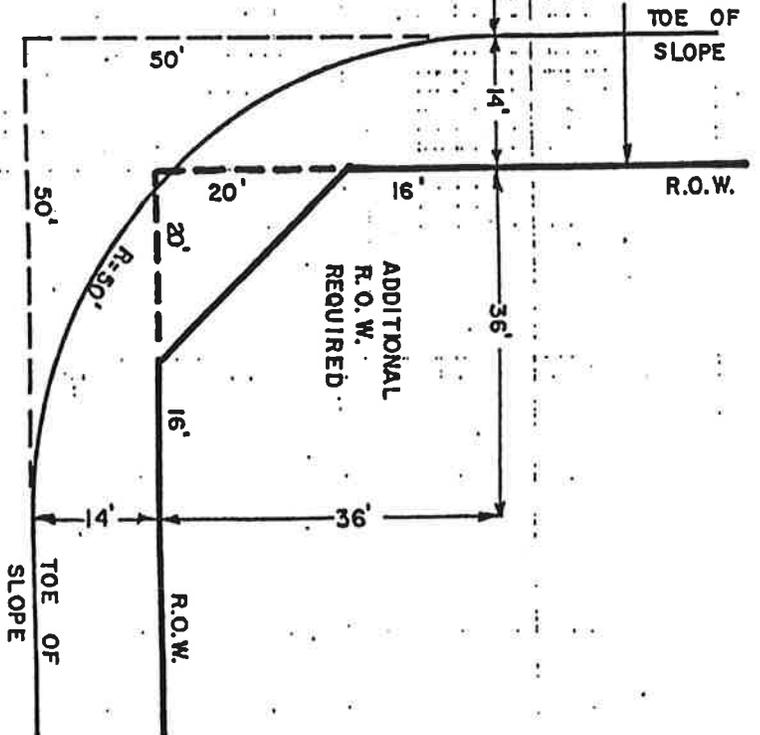
All 30' radii to be paved on all secondary roads and primary roads.

TYPICAL

All 50' radii to be paved on all primary roads connecting to all major artery roads.

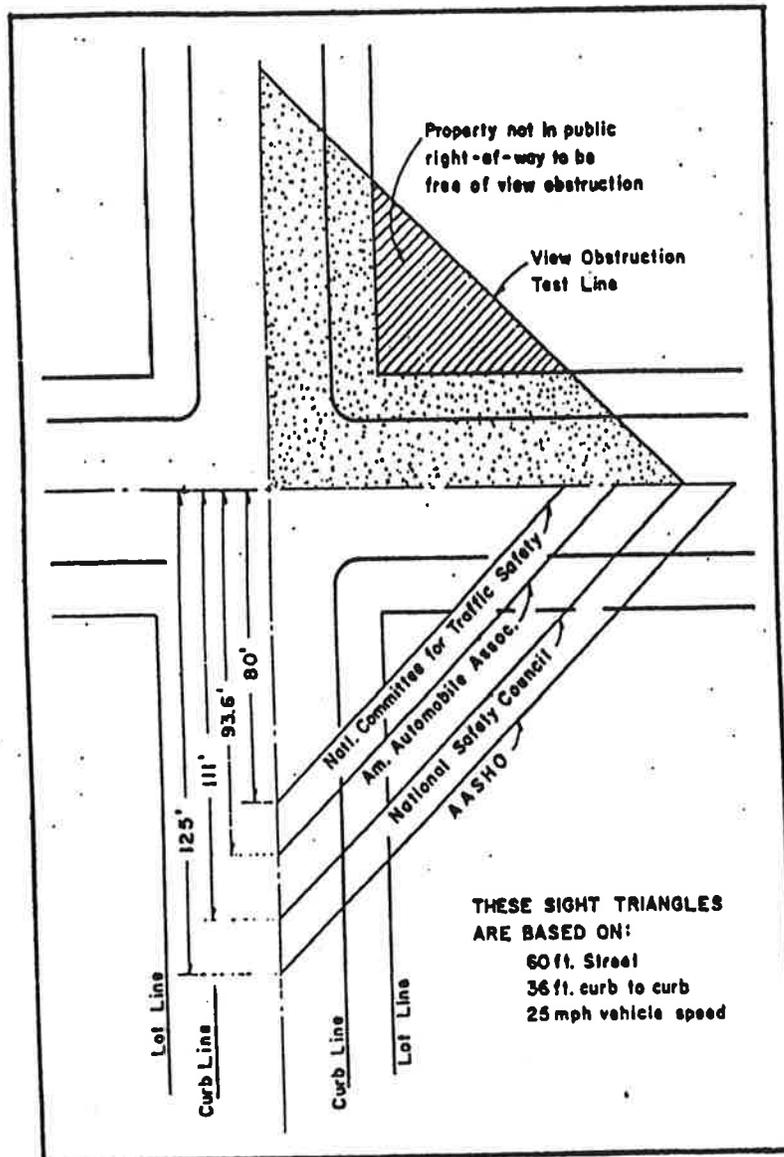
INTERSECTION

30 FT. & 50 FT. RADIUS



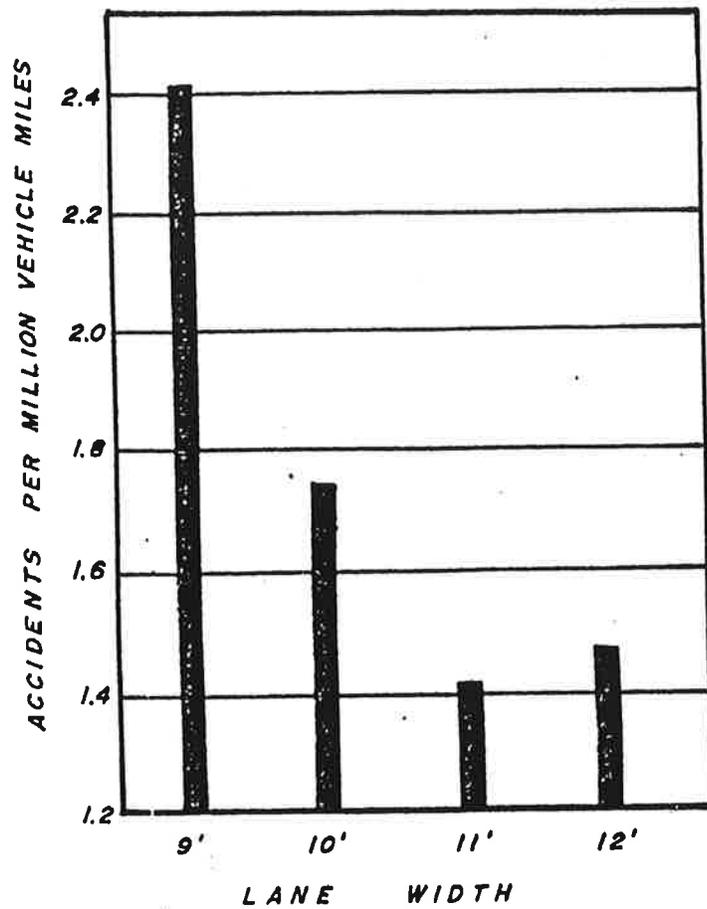
Intersection Design in Residential Areas

Composite drawing of sight triangles. These are based on various engineering formulae that typically include approach velocities and stopping distances for standard reaction times and deceleration rates.



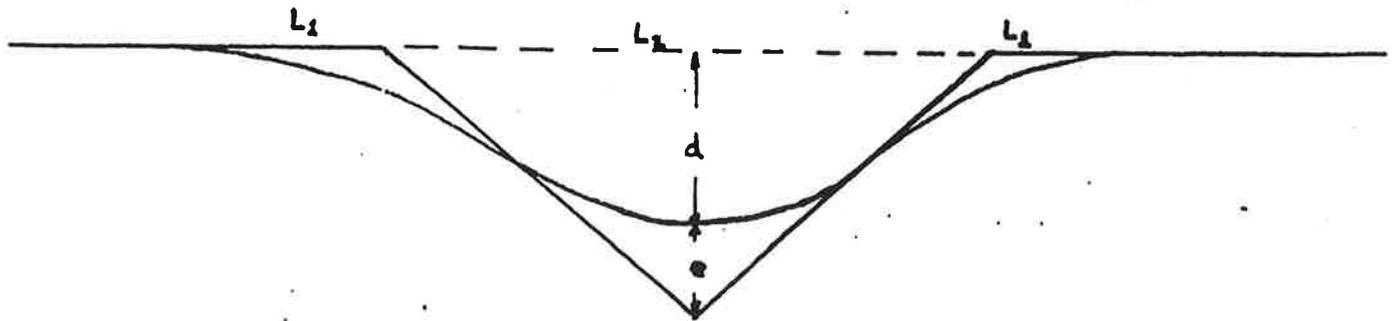
The primary safety consideration at intersections should be for vision. The inevitable conflict between vehicles approaching on a collision course requires that drivers see each other far enough in advance to yield. There can be no greater menace on the road than the blind or blinded driver.

LANE WIDTHS VS ACCIDENT RATE



SOURCE: "Rural Highway Geometry Relationship to Accident Rates in Louisiana," by Ollie K. Dart and L. Mann, Jr., unpublished, 1970, p. 23 (31).

DRAINAGE DIPS DESIGNED FOR RIDING QUALITY



D I P S

Depth d = ft.	30-40 MPH			60-70 MPH		
	L ₁	L ₂	e	L ₁	L ₂	e
0.48	25	35	0.17	50	70	0.17
0.50	30	40	0.20	50	70	0.21
0.58	30	40	0.24	60	80	0.24
0.67	30	40	0.26	60	80	0.26
0.75	30	40	0.32	60	80	0.32
0.83	32	50	0.37	60	100	0.38
0.92	34	50	0.39	70	100	0.38
1.00	36	50	0.41	70	100	0.42
1.20	40	60	0.54			
1.50	40	70	0.70			
1.75	50	70	0.72			
2.00	50	70	0.82			

DEFINITIONS: "Section-mile" - The distance between two section lines of roads. This distance need not be exactly one mile, but may vary because of variations in distances between existing lateral roads, section lines, survey variances and other slight variations not expressly mentioned herein.
"Density- business & residential" - This is a unit of measure determined by recording the given number of single family or multi family residences or dwellings or business structures not located on the same property as a private dwelling, the access to which depends upon any section-mile of Randall County road.

PROCEDURE: Roads that have not been formally dedicated to the public, and roads that have not been accepted for County maintenance will not be included or treated under this policy. Neither will any road without adequate dedicated right-of-way in the judgment and determination of the Randall County Road Superintendent, whose duty it is to carry out this procedure when directed by the Commissioners' Court.

During the month of December of every year, the Road Superintendent, or his representative under his direction and control, together with the Commissioner representing the precinct being surveyed, will count and record the residences, dwellings, and business structures that qualify under the foregoing definition of Density. The count will be made on a section-mile basis. On any road that is less than one mile in length, the density and the actual length will be recorded, and the Density will be computed as though the road was one mile in length.

When the survey and count is completed, and when all density computations have been made, all roads will be listed by section-mile with the highest Density at the top of the listing and graduating downward as the density decreases.

The foregoing will be used to establish the order in which the road upgrading work will be performed. When two or more section-miles of road have the same density the order of work will be determined by which section-mile is nearer the Randall County Courthouse. Work will continue in order of Density until funds allocated for this upgrading during each budget year have been expended.

VOL. 18 PAGE 212

SPECIAL PRIORITY FOR PARTICIPATION: Special priority may be given to citizens whose homes and/or businesses are on rural dirt roads and who as a group make a good faith offer to engage in reasonable participation in the cost of all weather surfacing of the roads adjacent to their premises. Reasonable participation is intended to mean 50% or more of the anticipated cost of upgrading on a particular project. By cost, is intended to mean the cost of materials, delivered to the job site, and the fuel cost of all equipment used to complete the work.

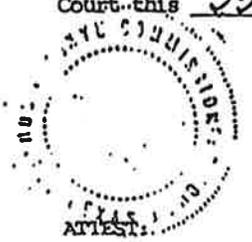
APPLICATION OF BUDGETED FUNDS TO SPECIAL PRIORITY PROJECTS: During any budget year where reasonable financial participation offers are outstanding, it will be the intent of the Court to devote 75% of the funds budgeted for upgrading county rural roads to projects in which there is no private citizen participation and 25% thereof to upgrading roads given priority due to reasonable participation.

GENERAL POLICY: Road upgrading will not be done on less than a section-mile increment unless the road is less than one mile in total length. Any section-mile of road upgrading will begin or end at another all weather surfaced road. Any road that qualifies for upgrading under the density program defined above will be upgraded on the basis of the closest route to an all-weather road.

The number of miles of road to be upgraded each year will be determined by the amount of funds budgeted, not by any set number of section-miles. The cost of upgrading will include the cost of materials, delivered to the job site, and the fuel cost of all equipment used to complete the work.

No road in Randall County which has some type of all weather surface will be considered for up-grading.

READ IN OPEN COURT AND PASSED by the Randall County Commissioners' Court this 23rd day of November, A. D. 1981.



RANDALL COUNTY COMMISSIONERS COURT
by Charles M. Purcell
Charles M. Purcell, County Judge

LeRoy Hutton
LeRoy Hutton, County Clerk

VOL. 18 PAGE 212

