City of Copperas Cove

NOTICE OF MEETING
OF THE
GOVERNING BODY OF
COPPERAS COVE, TEXAS

An agenda information packet is available for public inspection in the Copperas Cove Public Library, City Hall and on the City's Web Page, www.ci.copperas-cove.tx.us

Notice is hereby given that a **Regular Council Meeting** of the City of Copperas Cove, Texas, will be held on the **17th day of August 2010** at **7:15 p.m.** in the City Hall Council Chambers at 507 South Main Street, Copperas Cove, Texas 76522, at which time the following subjects will be discussed:

A. CALL TO ORDER

B. INVOCATION AND PLEDGE OF ALLEGIANCE

C. ROLL CALL

D. ANNOUNCEMENTS

E. PUBLIC RECOGNITION

1. Employees of the Second Quarter 2010. ***Andrea M. Gardner, City Manager***

   - Public Safety Division – Jennifer Henry, Municipal Court Clerk
   - Community Services Division – Davis Dewald, Golf Shop Assistant
   - Public Works Division – Jesus Mora, Solid Waste Mechanic
   - Administrative Services Division – June Mantanona, Utilities Customer Service Representative

2. Proclamation: Storm Water Pollution Prevention Week. ***John Hull, Mayor***

F. CITIZENS FORUM – At this time, citizens will be allowed to speak for a length of time not to exceed five minutes per person. Thirty minutes total has been allotted for this section. Pursuant to §551.042 of the Texas Open Meetings Act, any deliberation or decision about the subject of inquiry shall be limited to a proposal to place the subject on the agenda for a subsequent meeting.

G. CONSENT AGENDA – All matters listed under this item are considered to be routine by the City Council and will be enacted by one motion. There will not be separate discussion of these items. If discussion is desired, that item will be removed from the consent agenda and considered separately.

1. Consideration and action on approving the minutes from the workshop council meeting on July 27, 2010. ***Jane Lees, City Secretary***

2. Consideration and action on approving the minutes from the special council meeting on July 28, 2010. ***Jane Lees, City Secretary***

3. Consideration and action on approving the minutes from the workshop council meeting on August 3, 2010. ***Jane Lees, City Secretary***

4. Consideration and action on approving the minutes from the regular council meeting on August 3, 2010. ***Jane Lees, City Secretary***

5. Consideration and action on approving the minutes from the special council meeting at 6:00 p.m. on August 5, 2010. ***Jane Lees, City Secretary***

6. Consideration and action on approving the minutes from the special council meeting at 6:30 p.m. on August 5, 2010. ***Jane Lees, City Secretary***

7. Consideration and action on approving the minutes from the workshop council meeting on August 5, 2010. ***Jane Lees, City Secretary***

8. Consideration and action on authorizing the City Manager to enter into an Inter-local Agreement with the Copperas Cove Independent School District to share facilities for recreational purposes. ***Ken Wilson, Director of Community Services***

9. Consideration and action on a resolution accepting the quarterly investment report as presented for the quarter ending June 30, 2010 per the Investment Policy. ***Imelda Rodriguez, Director of Financial Services***

H. PUBLIC HEARINGS/ACTION

1. Public hearing and action on an ordinance amending the overall budget for the active Capital Improvement Project Bond Funds for the City of Copperas Cove. ***Imelda Rodriguez, Director of Financial Services***

2. Public hearing, consideration and action on adopting a land disturbance ordinance. ***Wesley Wright, P.E., City Engineer***

3. Public hearing, consideration and action on adopting an ordinance establishing a Drainage Criteria Manual. ***Wesley Wright, P.E., City Engineer***

4. Public hearing on the annexation of 6.8 acres owned by the City of Copperas Cove to the City. ***J. Mike Baker, Fire Chief/EMC***

5. Public hearing on the annexation of 155.8906 acres of land in Coryell County, Texas being owned by the Copperas Cove Economic Development Corporation and generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove. ***Wesley Wright, P.E., City Engineer***

I. ACTION ITEMS

1. Consideration and action on approval of the Copperas Cove Economic Development Corporation FY2010-2011 Budget. ***Polo Enriquez, CCEDC Executive Director***

2. Consideration and action on evaluating the services of Municipal Court Judge. ***Andrea M. Gardner, City Manager***

3. Consideration and action on evaluating the services of City Attorney and Municipal Court Prosecutor. ***Andrea M. Gardner, City Manager***

J. REPORTS FROM OUTSIDE ENTITIES, ADVISORY COMMITTEES AND BOARDS

K. ITEMS FOR FUTURE AGENDAS

L. EXECUTIVE SESSION

M. RECONVENE INTO OPEN SESSION FOR POSSIBLE ACTION RESULTING FROM ANY ITEMS POSTED AND LEGALLY DISCUSSED IN EXECUTIVE SESSION

N. ADJOURNMENT

The City Council reserves the right to adjourn into Executive Session at any time regarding any issue on this agenda for which it is legally permissible.

City Hall is wheelchair accessible and accessible parking spaces are available. Requests for accommodations or interpretive services must be made 48 hours prior to the meeting. Please contact the City Secretary at (254) 547-4221, (254) 547-6063 TTY, or FAX (254) 542-8927 for information or assistance.

I, the undersigned authority, do hereby certify that the above Notice of Meeting of the Governing Body of the City of Copperas Cove was posted at _____, August 13, 2010, on the glass front door of City Hall, a place convenient and readily accessible to the general public at all times.

_____
Jane Lees, TRMC, CMC
City Secretary

City of Copperas Cove

NOTICE OF WORKSHOP
OF THE
GOVERNING BODY OF
COPPERAS COVE, TEXAS

An agenda information packet is available for public inspection in the Copperas Cove Public Library, City Hall and on the City's Web Page www.ci.copperas-cove.tx.us

Notice is hereby given that a **Workshop** of the City of Copperas Cove, Texas will be held on the **17th day of August 2010,** at **6:00 p.m.,** in the City Hall Council Chambers at 507 South Main Street, Copperas Cove, Texas 76522 at which time the following subjects will be discussed:

A. CALL TO ORDER

B. ROLL CALL

C. WORKSHOP ITEMS

1. Discussion of the Fiscal Year 2010-11 Proposed Budget and City Council changes to the Fiscal Year 2010-11 City Manager's Proposed Budget. ***Andrea M. Gardner, City Manager***

2. Provide direction to the City Manager regarding the Fiscal Year 2010-11 Proposed Budget and City Council changes to the City Manager's 2010-11 Proposed Budget. ***Andrea M. Gardner, City Manager***

D. ADJOURNMENT

City Hall is wheelchair accessible and accessible parking spaces are available. Requests for accommodations or interpretive services must be made 48 hours prior to the meeting. Please contact the City Secretary at (254) 547-4221, (254) 547-6063 TTY, or FAX (254) 547-5116 for information or assistance.

I, the undersigned authority, do hereby certify that the above Notice of Meeting of the Governing Body of the City of Copperas Cove was posted at _____, August 13, 2010 on the glass front door of City Hall, a place convenient and readily accessible to the general public at all times.

_____
Jane Lees, TRMC, CMC, City Secretary

FY 2011 General Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Current Ad Valorem Taxes	6,531,155	6,717,742	186,587
TOTAL			**$186,587**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Salaries & Benefits – City Manager	227,287	230,225	2,938
Salaries & Benefits – City Secretary	119,114	120,629	1,515
Salaries & Benefits – Finance Department	492,189	498,927	6,738
Salaries & Benefits – Human Resources	210,001	212,617	2,616
Salaries & Benefits – Information Systems	244,366	247,670	3,304
Salaries & Benefits – Municipal Court	252,932	256,215	3,283
Salaries & Benefits – Police Department	4,306,998	4,360,026	53,028
Salaries & Benefits – Animal Control	191,891	194,233	2,342
Salaries & Benefits – Fire Department	2,869,317	2,901,424	32,107
Salaries & Benefits – Engineering	132,136	133,926	1,790
Salaries & Benefits – Street Department	207,297	209,932	2,635
Salaries & Benefits – Fleet Services	212,958	215,777	2,819
Salaries & Benefits – Facility Maintenance	55,406	56,108	702
Salaries & Benefits – Planning	55,970	56,721	751
Salaries & Benefits – Building Development	180,123	182,556	2,433
Salaries & Benefits – Code & Health	168,084	170,237	2,153

FY 2011 General Fund Proposed Budget Changes

Salaries & Benefits – Parks & Recreation	851,726	861,273	9,547
Salaries & Benefits – Library	429,457	435,142	5,685
Transfer Out to SAFER Fund			3,721
Transfer to Cemetery Fund			440
Transfer to Golf Course Fund			4,316
Transfer to Recreation Activities Fund			(707)
TOTAL			**$144,156**

FY 2011 Water & Sewer Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Senior Citizen Discount	(142,000)	0	142,000
Transfer In from Drainage Fund	43,839	20,000	(23,839)
TOTAL			**$118,161**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Salaries & Benefits – Public Works	305,206	308,745	3,539
Salaries & Benefits – Utility Administration	416,767	422,092	5,325
Salaries & Benefits – Water Distribution	521,221	527,799	6,578
Salaries & Benefits – Sewer Collection	376,747	381,650	4,903
Salaries & Benefits – Wastewater Treatment	519,908	526,734	6,826
Salaries & Benefits – Composting	136,436	138,213	1,777
TOTAL			**$28,948**

FY 2011 Solid Waste Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Senior Citizen Discount	(41,500)	0	41,500
TOTAL			**$41,500**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Salaries & Benefits – Solid Waste Operations	218,428	221,214	2,786
Salaries & Benefits – Residential	160,409	162,352	1,943
Salaries & Benefits – Recycling	77,329	78,294	965
Salaries & Benefits – Brush	81,054	82,039	985
Salaries & Benefits – Commercial	158,655	160,620	1,965
Salaries & Benefits – Solid Waste Disposal	180,543	182,821	2,278
TOTAL			**$10,922**

FY 2011 Golf Course Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Transfer In from General Fund	0	4,316	4,316
TOTAL			**$4,316**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Salaries & Benefits – Golf Course Operations	99,801	101,141	1,340
Salaries & Benefits – Course Maintenance	226,359	229,335	2,976
TOTAL			**$4,316**

FY 2011 Drainage Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
TOTAL			

Expenditures	Proposed Budget	Revised (Changed)	Difference
Operating Expenditures – Drainage	316,325	318,938	2,613
Transfer Out to General Fund	57,136	80,000	22,864
Capital Improvement Projects	28,500	0	(28,500)
TOTAL			**($3,023)**

FY 2011 Recreation Activities Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Transfer In from General Fund	7,941	7,234	(707)
TOTAL			**($707)**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Personnel Services – Recreation Activities	98,729	98,022	(707)
TOTAL			**($707)**

FY 2011 Cemetery Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Transfer In from General Fund	26,386	26,826	440
TOTAL			**$440**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Salaries & Benefits	35,549	35,989	440
TOTAL			**$440**

FY 2011 City-Wide Grants Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
Transfer In from General Fund	371,230	374,951	3,721
TOTAL			**$3,721**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Expenditures – SAFER Grant	403,547	407,268	3,721
TOTAL			**$3,721**

FY 2011 Hotel Occupancy Tax Fund Proposed Budget Changes

Revenues	Proposed Budget	Revised (Changed)	Difference
TOTAL			**$0**

Expenditures	Proposed Budget	Revised (Changed)	Difference
Promo of Tourism – Chamber of Commerce	170,000	177,750	7,750
Promo Tourism – Downtown	12,000	0	(12,000)
Promo of Arts – C. Cove Country Opry	4,000	0	(4,000)
TOTAL			**($8,250)**

FY 2011 Position Listing and Salary Ranges by Department
Proposed Budget Changes

As Proposed

Fund	Dept	No EEs	Department Name	Position Title	Hourly Salary Minimum	Hourly Salary Maximum
01	31	1	Finance	Budget Analyst	23.50	34.62

Recommended Revision (Change)

Fund	Dept	No EEs	Department Name	Position Title	Hourly Salary Minimum	Hourly Salary Maximum
01	31	1	Finance	Budget Analyst	22.25	32.77

CITY OF COPPERAS COVE, TEXAS
RECAP OF NEW PROGRAMS AND SERVICES
PROPOSED AS PART OF THE 2010 TAX NOTE ISSUE
FISCAL YEAR 2010-11

Fund/Dept-Division	Description	Cost
Tax Supported		
City Secretary	Document Imaging Software	$ 45,000
Finance	CIP Planner	34,000
Finance	Payroll Time Keeping Module	56,000
Fire	Repair Station #1 Parking Lot	14,000
Fire	New Replacement Ambulance & Defibrillator	144,322
Fire	New Prevention Vehicle	40,853
Fire	Replacement SCBA Units	136,500
Fire	New Fire House Software	10,100
Fire	Repair Fire Station #1	44,000
Fire	PPE Storage Racks	12,000
Fire	Replace Hydrant, Hose, and Nozzle	13,000
Human Resources	Online Applicant Tracking System	7,500
Information Services	RushWorks Vdesk Video Production System	24,818
Information Services	New Server with SAN Storage	16,000
Parks and Recreation	Pick up Truck - 1/2 Ton (2)	44,000
Parks and Recreation	Pull Type Top Dresser Self-Contained	14,000
Parks and Recreation	Utility Vehicle with Sprayer	37,000
Parks and Recreation	Utility Tractor	37,000
Parks and Recreation	Ztrac Mower (3)	29,574
Parks and Recreation	Sod Cutter	4,825
Planning	Zoning Ordinance Update	75,000
Planning	Development Process Consultant	50,000
Police	2011 4-Door Sport Utility Vehicle	33,600
Streets	Ford F-550 with Altec AT37G Bucket Truck	65,985
Streets	Avenue F Reconstruction	122,531
Streets	CAT 420D Backhoe Loader	100,000
	Tax Supported Total	**1,211,608**
Water & Sewer Fund		
Public Works	Water/Wasterwater Rate Study	40,000
Utilities	Tyler Content Manager SE	7,230
Utilities	Tele-Works Outbound Notification	4,980
Water Distribution	Replacement of Fleet Unit 82-15 (GMC Sierra Truck)	26,300
Water Distribution	7-Mile Pump/Storage Facility VFD Upgrade	25,000
Non-Dept	CDBG Grant	55,000
	Water & Sewer Fund Total	**158,510**
Solid Waste Fund		
SW Commercial	Replacement of Sideloader Truck - Unit #901-32	168,800
SW Disposal	Replacement of Komatsu Tractor - Unit #902-1	150,000
SW Recycling	Replacement Roll Off Truck	135,250
	Solid Waste Fund Total	**454,050**
Drainage Fund		
Drainage	Colorado Drive Stem Wall	28,500
	Drainage Fund Total	**28,500**
	Bond Issues Costs	**50,000**
	Total Proposed 2010 Tax Note Issue	**$1,902,668**

Recap of New Programs Proposed in the 2010 Tax Note Issue:	
Tax Supported	$1,211,608
Water & Sewer Fund	158,510
Solid Waste Fund	454,050
Drainage Fund	28,500
Bond Issue Costs	50,000
Total Proposed 2010 Tax Note Issue	**$1,902,668**

City of Copperas Cove

PROCLAMATION

WHEREAS, Polluted water discharged into creeks, rivers, and lakes can result in the death of fish, the destruction of wildlife habitats, a loss in aesthetic value, and contamination of drinking water sources and recreational waterways that can threaten public health; and

WHEREAS, the Clean Water Act of 1972 prohibits the discharge of any pollutant to navigable waters of the United States unless authorized the Environmental Protection Agency; and

WHEREAS, a major source of pollutants in the navigable waters of the United States is polluted urban and suburban storm water runoff; and

WHEREAS, the most common sources of urban and suburban storm water pollution are household hazardous chemicals, yard and pet waste, automotive chemicals, trash, and silt; and

WHEREAS, it is imperative that pollutants be prevented from entering the storm water runoff in Copperas Cove.

NOW, THEREFORE, I, John Hull, Mayor of the City of Copperas Cove, Texas, do hereby proclaim the week of August 16-20, 2010 as:

"Storm Water Pollution Prevention Week"

in the City of Copperas Cove and let it be known that the City Council of the City of Copperas Cove urge all citizens of this City to make efforts to reduce storm water pollution.

IN TESTIMONY WHEREOF, I witness my hand and the Seal of the City of Copperas Cove, Texas, this 17th day of August 2010.

_____

John Hull, Mayor

ATTEST:

_____

Jane Lees, City Secretary

CITY OF COPPERAS COVE
CITY COUNCIL WORKSHOP MEETING MINUTES
July 27, 2010 – 6:00 P.M.

A. CALL TO ORDER

Mayor John Hull called the workshop meeting of the City Council of the City of Copperas Cove Texas to order at 6:07 p.m.

B. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Jane Lees, City Secretary

C. WORKSHOP ITEMS

1. Presentation and discussion of the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

Andrea M. Gardner, City Manager, presented an overview of the General Fund. A copy of the presentation is attached to and made a part of these minutes. Subjects covered included the tax rate, tax rate distribution, General Fund balance, General fund revenues, General Fund Revenue Comparison by source, General Fund functions, General Fund expenditure comparison, Non-Departmental expenditure comparison by category, and Non-Departmental significant budget changes.

Presentations were given for each of the following departments –

Administration:

- City Manager
- City Council
- City Attorney
- City Secretary
- Human Resources
- Information Systems
- Fleet Services
- Facility Maintenance
- Finance
- Non Departmental

Public Safety:

- Police Department
- Animal Control
- Fire/EMS

- Code Compliance
- Emergency Management
- Municipal Court

Community Services:

- Parks & Recreation
- Recreation Activities Fund
- Library

Development Services:

- Building Development
- Streets
- Planning
- Engineering

Andrea M. Gardner, City Manager, presented an overview of the Golf Course Fund. A copy of the presentation is attached to and made a part of these minutes. Subjects covered included Golf Course Fund balance, Golf Course Fund revenues, Golf Course Fund revenue comparison by source, Golf Course Fund expense comparison by function, Non-Departmental Expenditure comparison by category, Non-Departmental significant budget changes.

Presentation followed for the Golf Course.

2. Provide direction to the City Manager regarding the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

Questions by various Council Members about proposed budgets were answered during the above presentations.

D. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 8:44 p.m.

_____
John Hull, Mayor

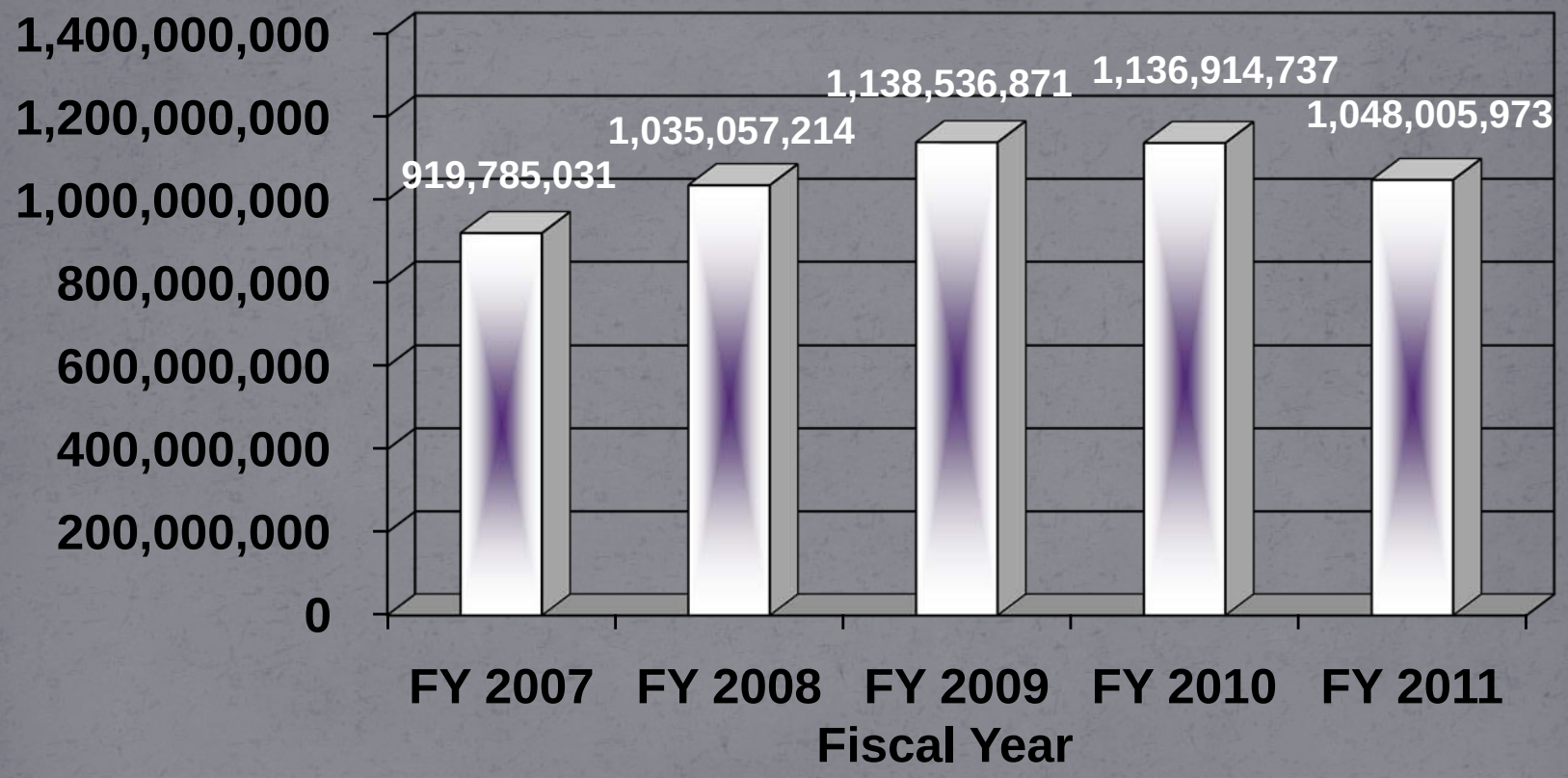
ATTEST:

_____
Jane Lees, City Secretary

General Fund

FY 2010 Proposed Budget

Net Taxable Value



*FY 2010 Net Taxable Value is based on estimates received from Coryell County & Lampasas County Appraisal Districts

Tax Rate

- Current Tax Rate - .7600
- Proposed Tax Rate - .7600
- One Cent of Proposed Tax Rate - $104,800
  - Net taxable value of $1,048,005,973
  - Divided by $100/assessed valuation = $10,480,060
  - Multiplied by 1 cent (.01) = $104,800
  - Adjusted for 99% collection rate = $103,752

Note: The Proposed Budget is using the projected assessed tax value with a 99% collection rate. On July 26, 2010 the Tax Roll should be Certified by the Chief Appraisers. At that time the City should receive an updated assessed value of which staff would recommend to budget a 99% collection rate in the final adopted budget.

The City has scheduled a Budget Workshop for August 3, 2010 to discuss the tax rate further.

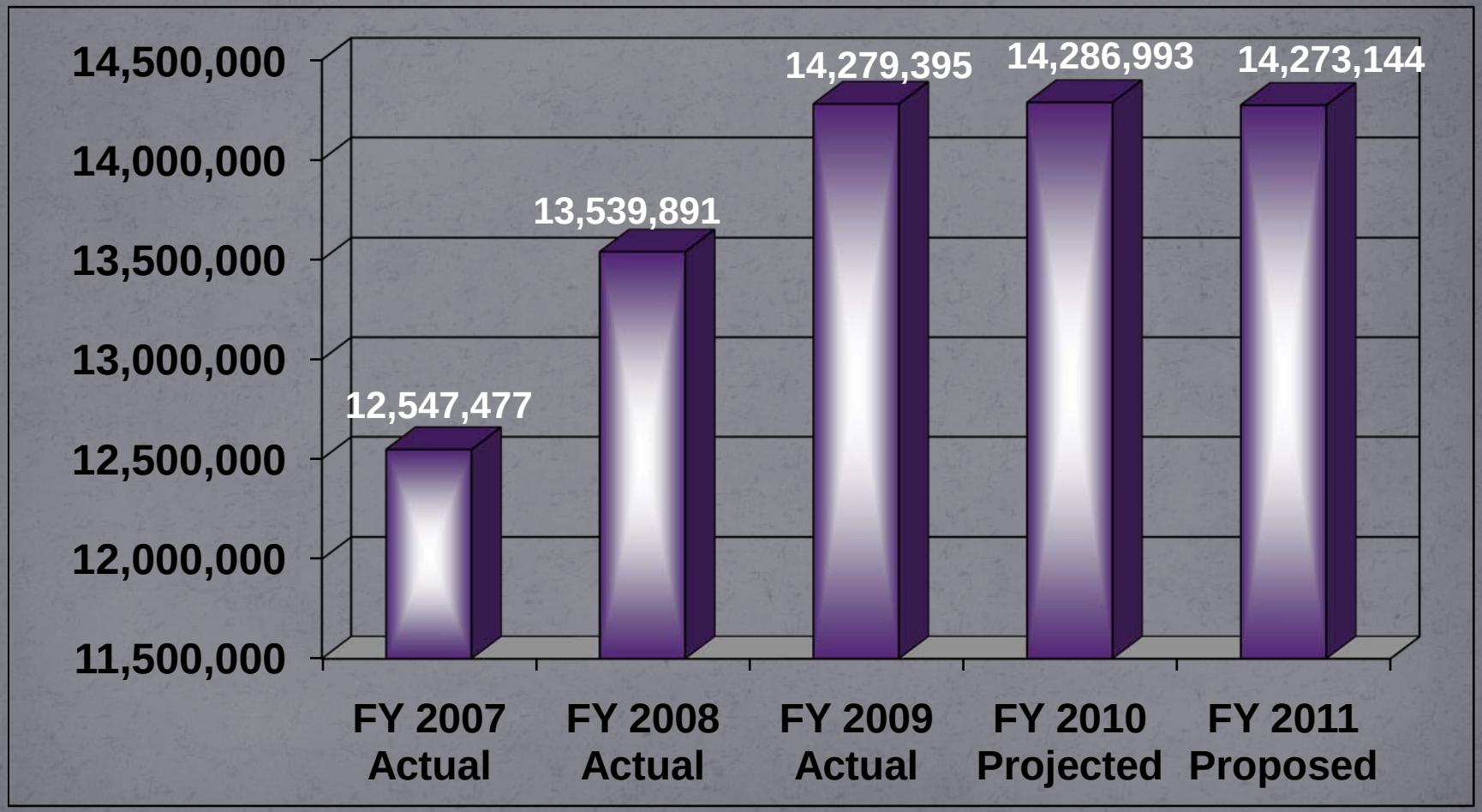
Tax Rate Distribution

Fiscal Year	General Fund	Debt Service	Total Tax Rate
2006	.653285	.121715	.775000
2007	.607085	.132915	.740000
2008	.598029	.141971	.740000
2009	.599300	.140700	.740000
2010	.599670	.160330	.760000
2011 Proposed	.594794	.165388	.760000

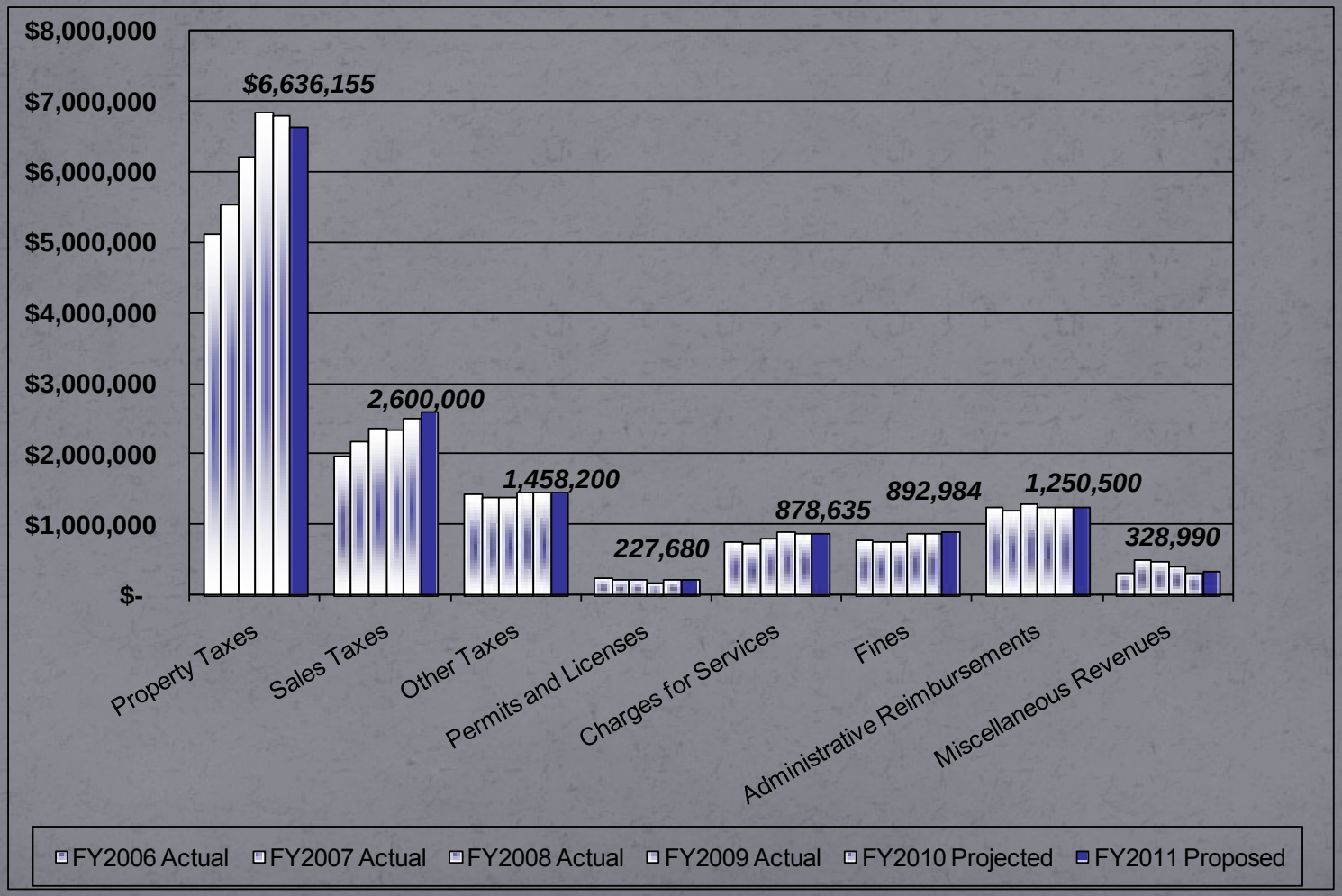
General Fund Balance

Estimated Fund Balance 10/01/2010	$4,725,957
Estimated Revenue for FY 2011	14,273,144
Total Funds Available	18,999,101
Estimated Expenditures for FY 2011	15,298,372
Projected Ending Fund Balance	$3,700,729
Ideal Fund Balance	$3,692,318
Over/(Under) Ideal Fund Balance	$8,411

General Fund Revenues



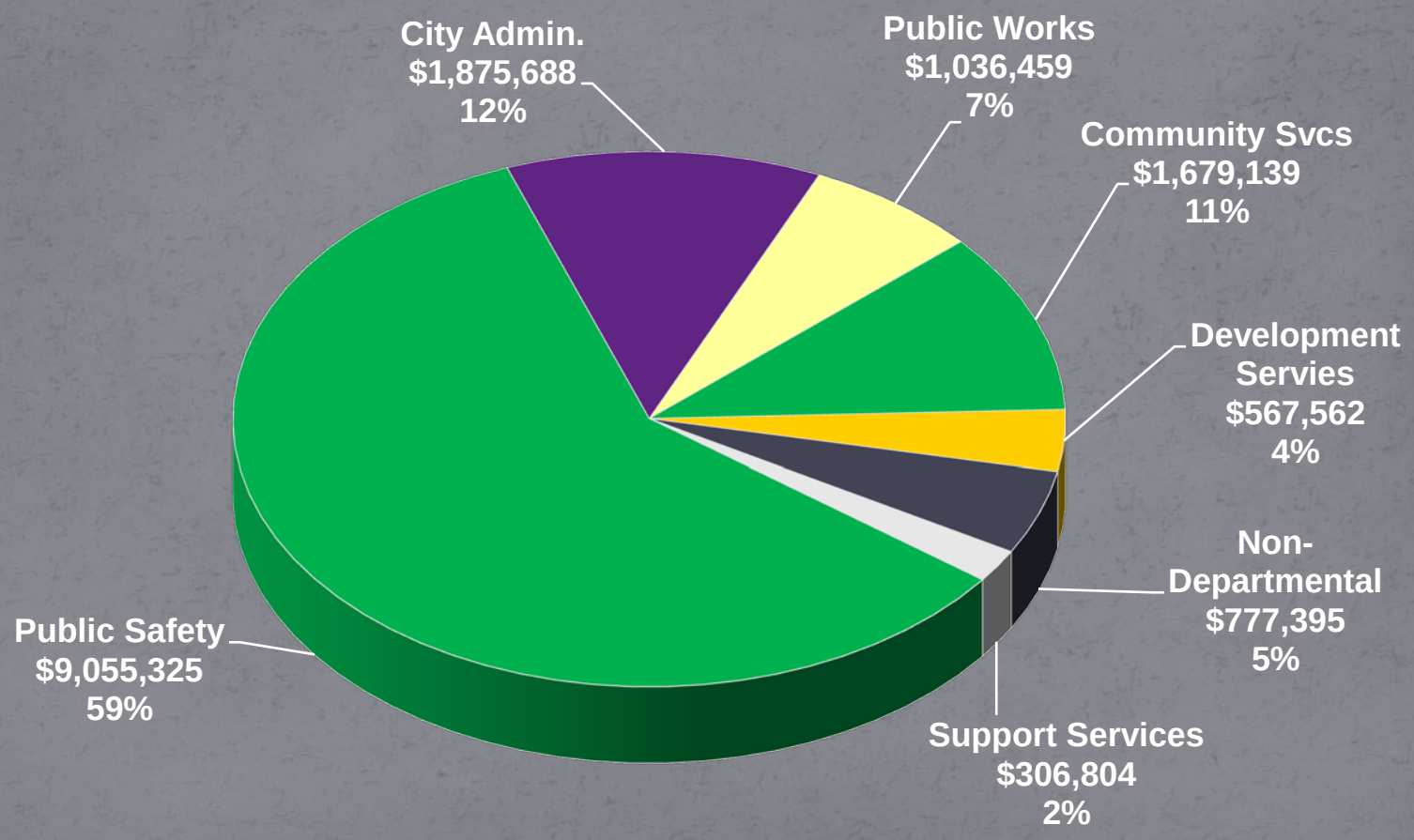
General Fund Revenue Comparison By Source



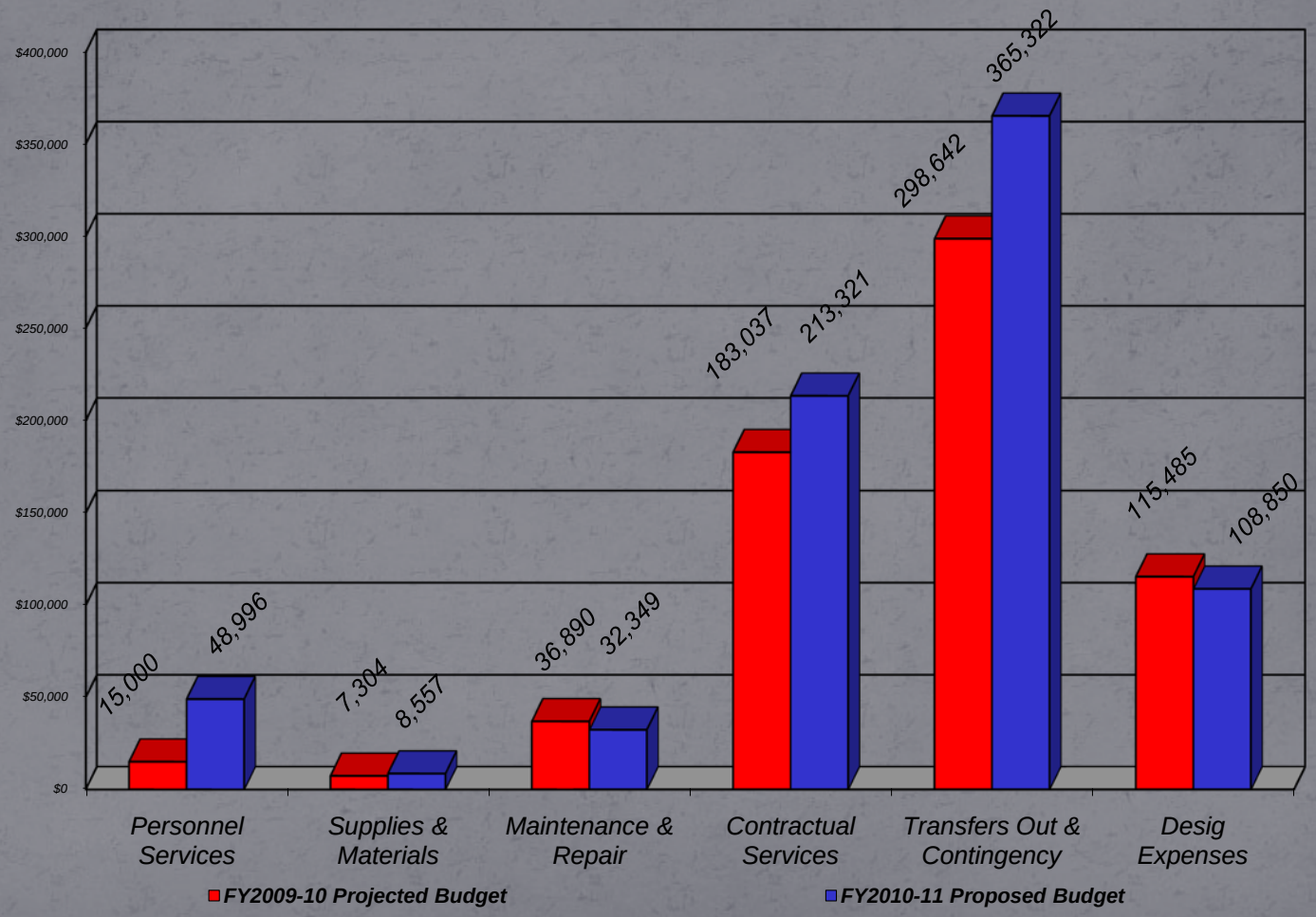
General Fund Functions (As Proposed)

- City Administration
  - City Council
  - City Manager
  - City Secretary
  - City Attorney
  - Finance (includes Purchasing)
  - Human Resources
  - Information Systems
- Public Safety
  - Police
  - Fire/EMS
  - Emergency Management
  - Animal Control
  - Municipal Court
- Community Services
  - Parks and Recreation
  - Library
- Development Services
  - Code & Health Compliance
  - Building
  - Planning
- Public Works
  - Streets
  - Engineering
- Support Services
  - Facility Maintenance
  - Fleet Maintenance
- Non-Departmental

General Fund Expenditure Comparison By Function



Non-Departmental Expenditure Comparison - By Category



Non-Departmental
Significant Budget Changes

- Personnel Services
  - In FY 2009-10, only unemployment compensation budget was included in this category. In FY 2010-11 Hill Country Transit (HOP) and Public Relations expenses are included.
- Contractual Services
  - Includes funds for a healthcare consultant.
  - Includes onsite security training.
- Transfers
  - To SAFER Grant Fund (General Fund Match) - $299,172
  - Contingency - $30,310

Changes to Proposed Budget?

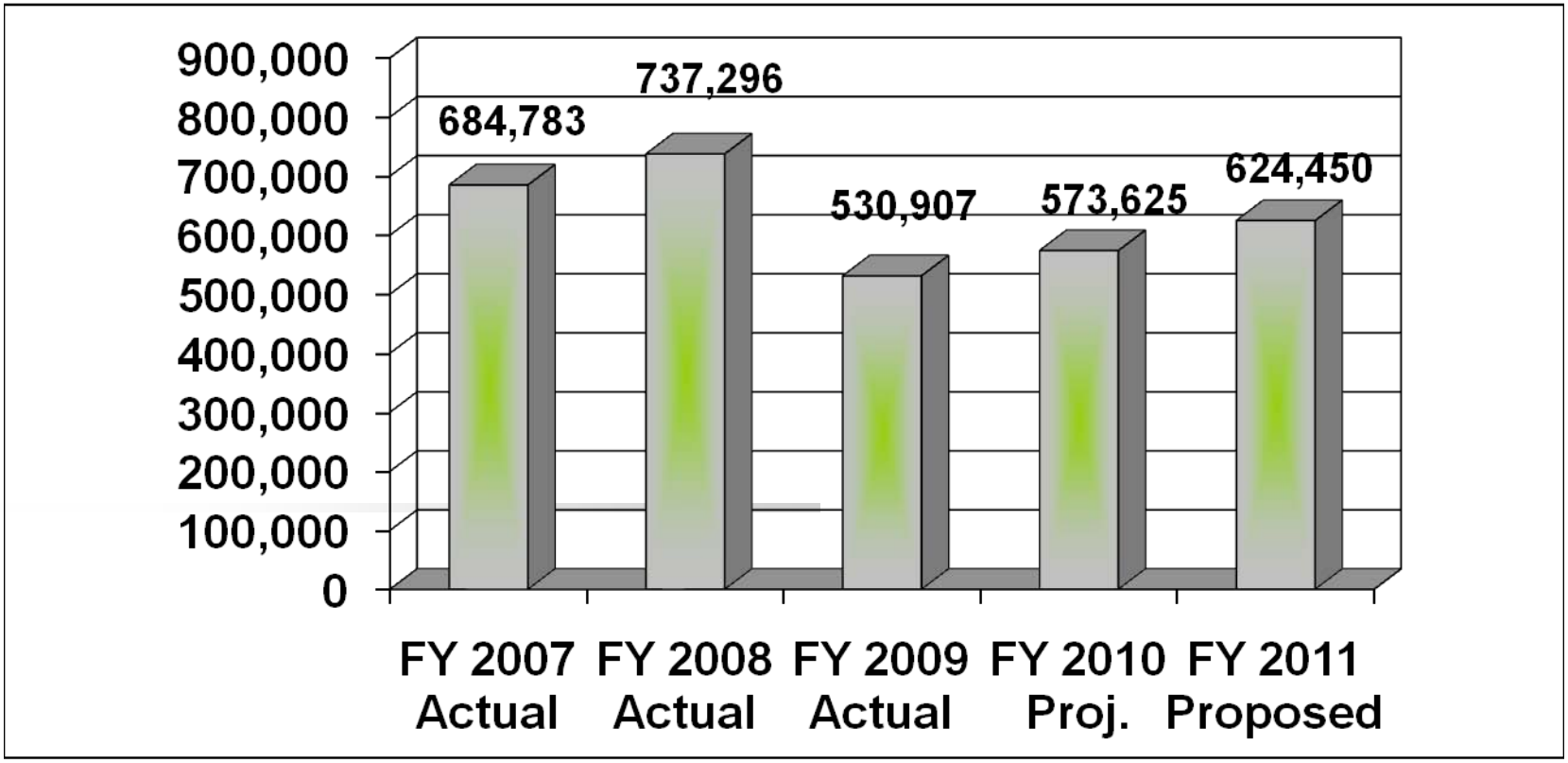
Golf Course Fund

Fiscal Year 2011 Proposed Budget

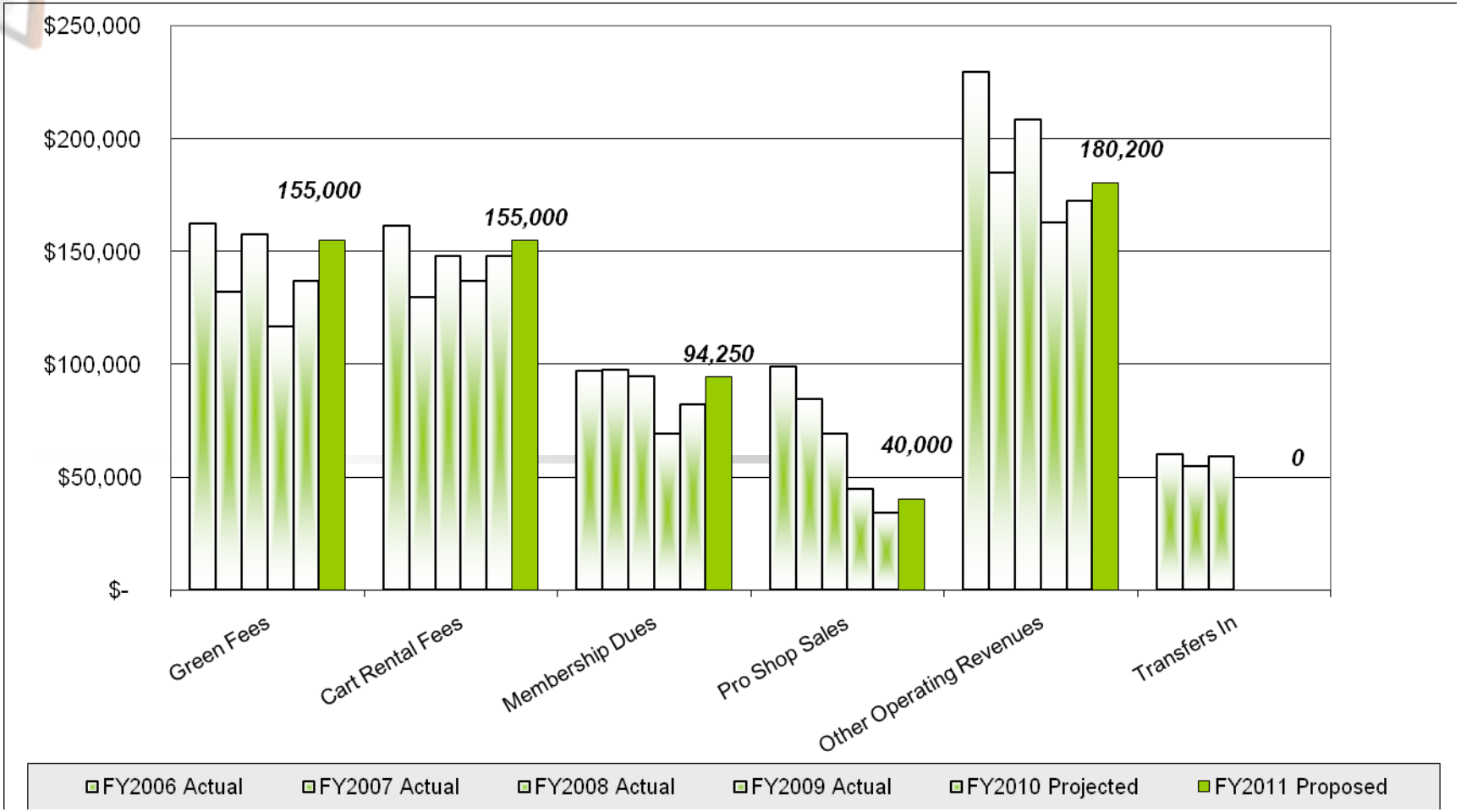
Golf Course Fund Balance

Estimated Fund Balance 10/01/2010	($130,913)
Estimated Revenue for FY 2011	$624,450
Total Funds Available	$493,537
Estimated Expenses for FY 2011	$614,702
Projected Ending Fund Balance	($121,165)
Ideal Fund Balance	$140,233
Over/(Under) Ideal Fund Balance	($261,398)

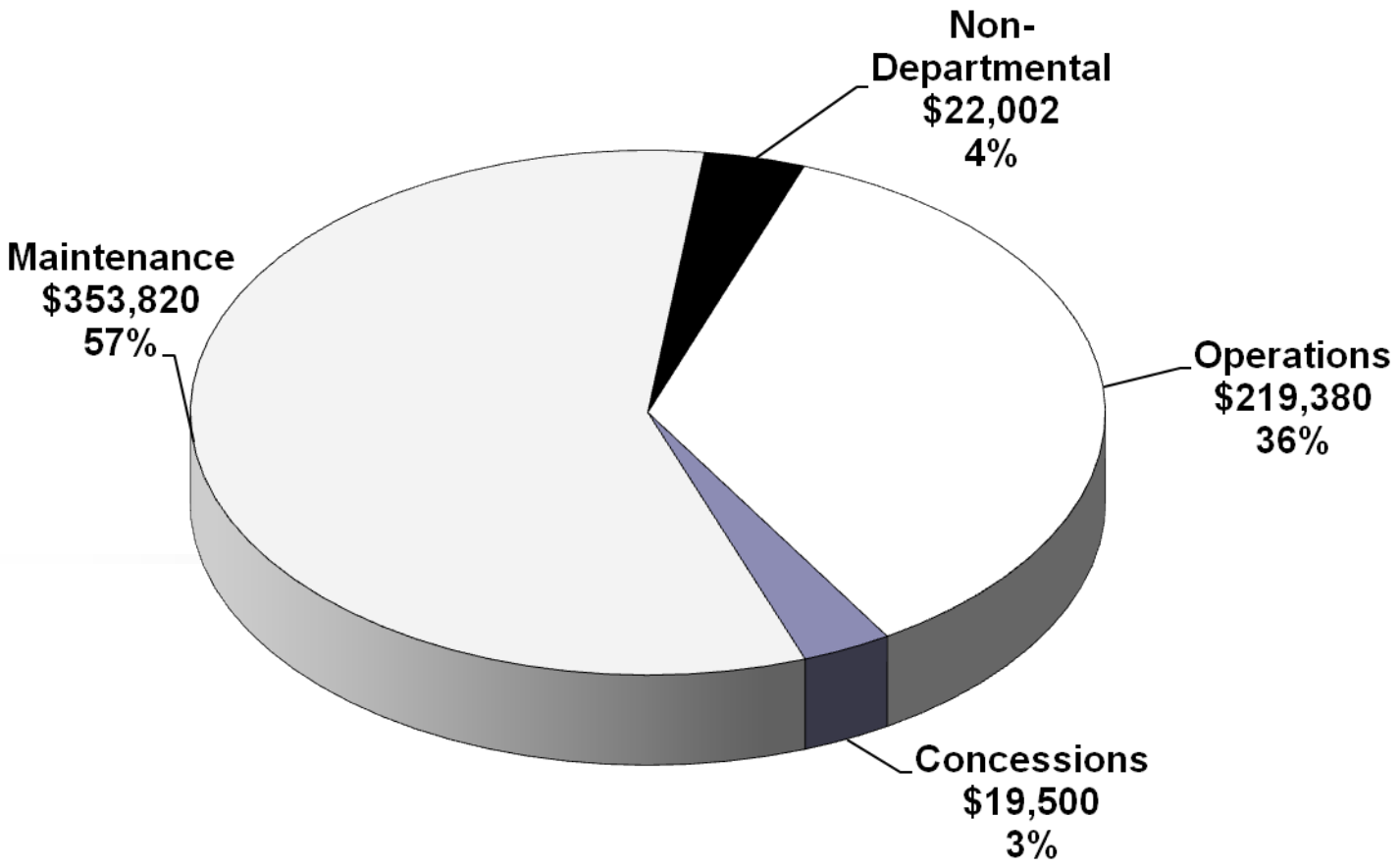
Golf Course Fund Revenues



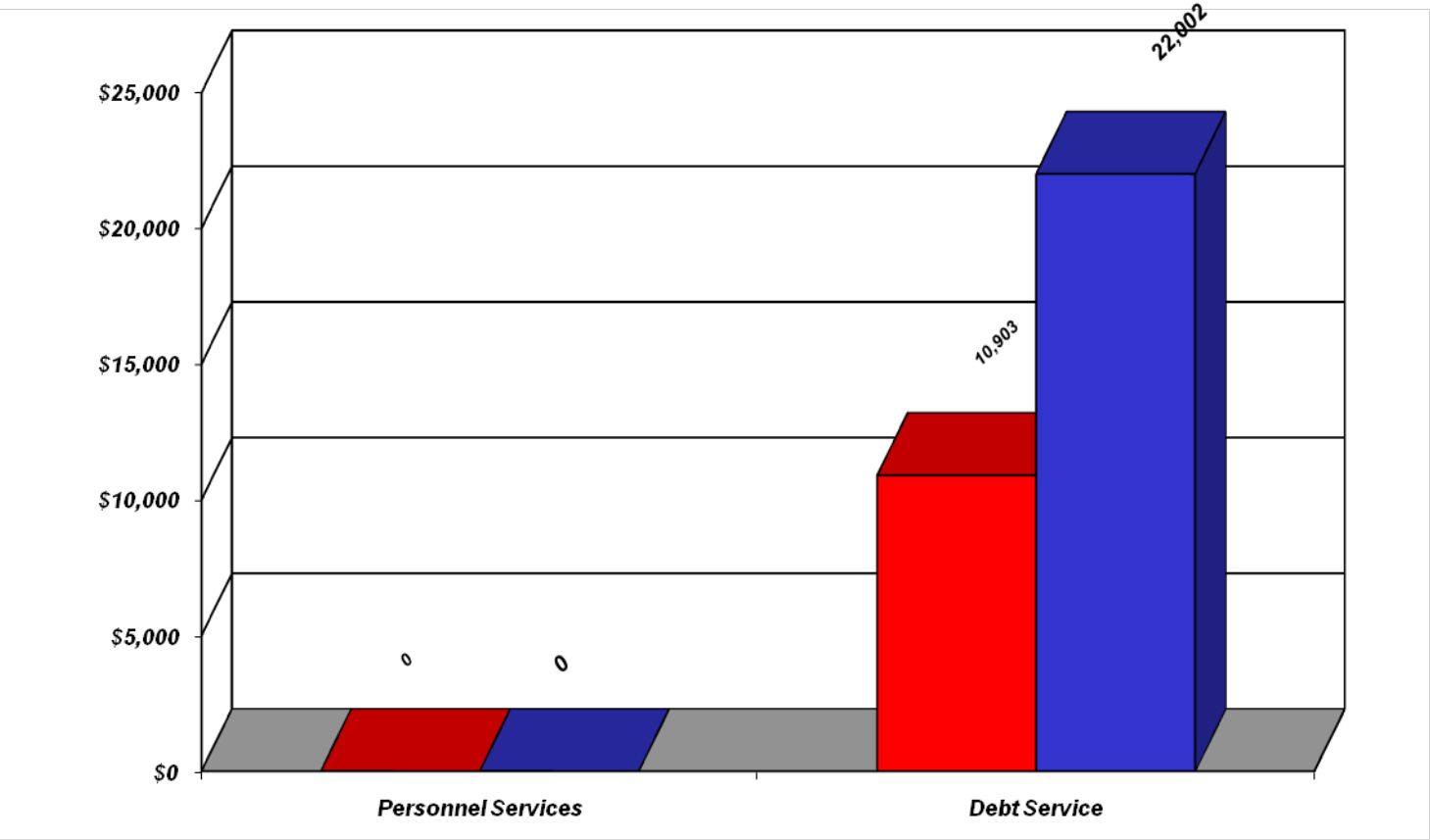
Golf Course Fund Revenue Comparison – By Source



Golf Course Fund Expense Comparison - By Function



Non-Departmental Expenditure Comparison - By Category



FY2009-10 Budget* FY2010-11 Proposed Budget

*As of July 7, 2009

Non-Departmental Significant Budget Changes

- **Debt Service**
  - Principal and Interest Payments were partially budgeted in the Capital Improvement Project fund in FY 2009-10 due to excess funds available in the 2008 Tax Note issuance.

Changes to Proposed Budget

CITY OF COPPERAS COVE
CITY COUNCIL SPECIAL MEETING MINUTES
July 28, 2010 – 5:30 P.M.

A. CALL TO ORDER

Mayor John Hull called the special meeting of the City Council of the City of Copperas Cove Texas to order at 5:30 p.m.

B. INVOCATION AND PLEDGE OF ALLEGIANCE – None.

C. ROLL CALL

John Hull
Cheryl L. Meredith - Absent
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Frank Seffrood

ALSO PRESENT

Tim Molnes, Assistant City Manager
Jane Lees, City Secretary

D. ANNOUNCEMENTS

E. PUBLIC RECOGNITION – None.

F. CITIZENS' FORUM – None.

G. CONSENT ITEMS – None.

H. PUBLIC HEARINGS/ACTION – None.

I. ACTION ITEMS

1. Consideration and action on a resolution canvassing returns and declaring the results of the Special Election held on July 20, 2010. ***Jane Lees, City Secretary***

Jane Lees, City Secretary, gave an overview of agenda item I-1. Ms. Lees introduced Rita Burgess, Election Judge, who read the results of the election for the record:

Council Member Position 6	Early Voting	Election Day	Total Votes
Roger "ODie" O'Dwyer	99	37	136
Jim Schmitz	309	118	427
Charles "Chuck" Downard	189	59	248
Totals	597	214	811

Council Member Seffrood made a motion to approve Resolution No. 2010-26 as presented. Council Member Smith seconded the motion, and with a unanimous vote, motion carried.

The resolution caption is as follows:

RESOLUTION NO. 2010-26

A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS, CANVASSING RETURNS AND DECLARING THE RESULTS OF THE SPECIAL ELECTION HELD ON JULY 20, 2010, FOR THE PURPOSE OF FILLING A VACANCY ON THE CITY COUNCIL.

J. REPORTS FROM OUTSIDE ENTITIES, ADVISORY COMMITTEES AND BOARDS – None.

K. ITEMS FOR FUTURE AGENDAS – None.

L. EXECUTIVE SESSION – None.

M. RECONVENE INTO OPEN SESSION FOR POSSIBLE ACTION RESULTING FROM ANY ITEMS POSTED AND LEGALLY DISCUSSED IN EXECUTIVE SESSION

N. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 5:34 p.m.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

CITY OF COPPERAS COVE
CITY COUNCIL WORKSHOP MEETING MINUTES
August 3, 2010 – 6:00 P.M.

A. CALL TO ORDER

Mayor John Hull called the workshop meeting of the City Council of the City of Copperas Cove Texas to order at 6:00 p.m.

B. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Jim Schmitz
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Charles E. Zech, City Attorney
Jane Lees, City Secretary

C. WORKSHOP ITEMS

1. Presentation and discussion on the proposed tax rate for Fiscal Year 2011. ***Andrea M. Gardner, City Manager***

Andrea M. Gardner, City Manager informed the Council that the tax rolls were certified last week by the Coryell County Appraisal District and the Lampasas County Appraisal District. Truth in Taxation requires that this body have a discussion on the property tax rate and the certified values. A representative from the Coryell County Appraisal District was present to answer any questions regarding the certified values for Coryell County.

The attached presentation titled "Property Tax" was given by Ms. Gardner and made a part of these minutes.

2. Provide direction to the City Manager regarding the Fiscal Year 2011 proposed tax rate. ***Andrea M. Gardner, City Manager***

Two options were presented to the Council as follows:

1. Adopt a tax rate equal of the Effective Tax Rate and proved a 1% COLA increase to all employees.
2. Adopt a tax rate equal to current tax rate and provide 1.5% COLA increase to all employees.

By consensus of the Council, direction was given to Ms. Gardner to use Option 2, in which the tax rate would be equal to the current tax rate and provide a 1.5% COLA increase to all employees.

3. Presentation and discussion of the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

The attached presentation titled “Drainage Fund” was given by Ms. Gardner and made a part of these minutes.

James Trevino, Assistant Public Works Director, gave an overview of the departmental budget for the Drainage Department.

The attached presentation titled “Solid Waste Fund” was given by Ms. Gardner and made a part of these minutes.

James Trevino, Assistant Public Works Director, gave an overview of the departmental budget for the Solid Waste Fund by division as follows:

1. Residential Collection
2. Commercial Collection
3. Disposal/Transfer Station
4. Non-Departmental
5. Brush Division
6. Recycling Department

The attached presentation titled “Water & Sewer Fund” was given by Ms. Gardner and made a part of these minutes.

Bob McKinnon, Public Works Director, gave an overview of the departmental budget for the Water & Sewer Fund by division as follows:
:

1. Public Works Administration
2. Utility Administration
3. Water Distribution
4. Sewer
5. Wastewater Treatment
6. Composting

4. Provide direction to the City Manager regarding the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

No direction given.

D. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 6:55 p.m.

ATTEST:

John Hull, Mayor

Jane Lees, City Secretary

Property Tax

City of Copperas Cove
An Overview of Property Tax Revenue
FY 2010-11

Property Tax Rate Components

- Components of a Property Tax Rate

  Maintenance & Operations Rate + Debt Rate = TOTAL TAX RATE

  - Effective or Rollback
    - Effective tax rate – a calculated rate that would provide the taxing unit with about the same amount of revenue it received in the year before, on properties taxed in both years.
    - Rollback tax rate – a calculated maximum rate allowed by law without voter approval. The rollback rate provides the taxing unit with about the same amount of tax revenue it spent the previous year for day-to-day operations, plus an extra 8 percent increase for those operations plus sufficient funds to pay debts in the coming year.
    - The debt rate is **not** subject to rollback provisions.

Source: "Truth-In-Taxation", May 2010

Effective Tax Rate Calculation

- Total Taxable Value (excludes tax ceilings) = $1,062,530,871
- Less taxable value of new improvements and new personal property = $25,931,510
- Less properties in territory annexed after January 1, 2008 = $0
- Equals 2010 Adjusted Taxable Value = $1,036,599,361
- Divide Adjusted 2009 taxes ($7,847,701) by 2010 Adjusted Taxable Value ($1,036,599,361)
- Equals .007570621
- .007570621 x 100 = Total Effective Tax Rate = .7570

Property Tax Debt Requirements

Issue	Principal	Interest	Total Debt Requirement
1998 General Obligation	80,000	11,210	91,210
2001 CO	110,000	8,740	118,740
2003 CO	65,000	109,212	174,212
2005 GO Refunding	418,932	61,738	480,670
2006 GO Refunding	9,000	37,384	46,384
2006 Tax Notes	165,000	20,247	185,247
2007 CO	20,000	207,835	227,835
2007 GO Refunding	6,000	54,077	60,077
2008 Tax Notes	145,000	31,206	176,206
2008A Tax Notes	110,000	35,920	145,920
2009 Tax Notes	50,000	15,818	65,818
2009 General Obligation	45,000	206,424	251,424
Debt Service Reserve	-	(200,000)	(200,000)
2008 Tax Notes	(145,000)	(31,206)	(176,206)
2010 General Obligation	-	72,129	72,129
2010 Tax Notes	-	6,098	6,098
Proposed 2010A Tax Notes	25,000	125,000	150,000
Totals	**1,103,932**	**971,832**	**1,875,764**

Rollback Debt
Tax Rate Calculation

- Total debt to be paid with property tax revenue = $1,875,766 (Adjusted Debt)
- Adjusted Debt /2010 Certified anticipated collection rate of 100%
- Equals Debt Adjusted for Collections = $1,875,766
- Divide Debt Adjusted for Collections by Total Taxable Value (excluding tax ceilings) = .00176538 X 100
- Equals Debt Tax Rate = .176538

This calculation includes existing debt payments and Proposed 2010A Tax Note Issue that is in the FY 2011 Proposed Budget.

Rollback M & O Tax Rate Calculation

- 2009 M & O tax rate/$100 = .599670
- 2009 Adjusted Taxable Value = $1,030,764,641
- 2009 M & O taxes = $6,181,186
- Plus taxes refunded for years preceding tax year 2009 = $10,959
- Equals Adjusted M & O taxes = $6,192,145
- Divide adjusted M & O taxes by 2010 adjusted taxable value ($1,036,599,361) X 100
- Equals 2010 effective M & O rate = .597351837
- 2010 Rollback M & O rate (Effective M & O rate x 1.08) = .645139984

Total Rollback Tax Calculation

- With Total Debt $1,875,766

  (including 2010A Proposed Tax Note Issuance)

  - Debt Rollback Rate = .1765
  - Plus M & O Rollback = .6450
  - Equals Total Rollback = .8215

Changes in Property Tax Revenue

Preliminary Values – April 2010

Identifier	Freeze Adjusted Taxable	Proposed Tax Rate	Total Tax Revenue
Coryell County Values	1,008,543,283	.7600	7,664,929
Lampasas County Values	39,462,690	.7600	299,916
Non-Freeze Tax Levy			***7,964,845***
Freeze Tax Levy			526,993
Total Tax Levy			***8,491,839***
Collection Rate			.99
Anticipated Revenue from Levy			**$8,406,920**
Less Required For Debt Service			(1,875,766)
Total General Fund Tax Revenues (Page 21 Proposed Budget)			**$6,531,155**

Changes in Property Tax Revenue

Certified Values – July 25, 2010

M&O Rate - .5835 I&S Rate - .1765

Identifier	Freeze Adjusted Taxable	Proposed Tax Rate	Total Tax Revenue
Coryell County Values	1,028,299,511	.7600	7,815,076
Lampasas County Values	39,157,030	.7600	297,593
Non-Freeze Tax Levy			***8,112,669***
Freeze Tax Levy			556,990
Total Tax Levy			***8,669,659***
Collection Rate			.99
Anticipated Revenue from Levy			**8,582,962**
FY 2011 Proposed Tax Revenue			8,406,921
Total Tax Revenue Increase from Proposed Budget			**$176,041**
Property Tax Revenue Increase to M&O			**$186,587**
Property Tax Revenue Decrease to I&S Reserves			**($10,546)**

Current Tax Rate Compared to ETR

Current Tax Rate = .7600

Tax Revenue Calculation	M&O Rate	I&S Rate	Total Tax Rate	Property Tax Revenue
Certified Values	.5835	.1765	.7600	$8,582,962
Preliminary Values	.5947	.1653	.7600	$8,406,921
Property Tax Revenue Increase (Preliminary vs Certified)				**$176,041**

Effective Tax Rate = .7570

Tax Revenue Calculation	M&O Rate	I&S Rate	Total Tax Rate	Property Tax Revenue
Certified Values	.5805	.1765	.7570	$8,551,260
Preliminary Values	.5947	.1653	.7600	$8,406,921
Property Tax Revenue Increase (Preliminary vs Certified)				**$144,339**

Governing Body Appropriation Options for Increase

1. Adopt a tax rate equal of the Effective Tax Rate and proved a 1% COLA increase to all employees.
2. Adopt a tax rate equal to current tax rate and provide 1.5% COLA increase to all employees.

Option 1 Impact on the General Fund

M&O Rate - .5805 I&S Rate - .1765

Tax Rate	Estimated Beginning Fund Balance	FY 2011 Projected Revenues	FY 2011 Projected Expenditures	Projected Ending Fund Balance	Ideal Fund Balance	Over/(Under) Ideal Fund Balance
.7570	4,725,957	14,428,028	15,392,541	3,761,445	3,715,049	46,396

Any changes to proposed expenditures will require "Ideal Fund Balance" to be recalculated. Only changes in property tax revenue from those proposed on 7/20/10 are depicted in this chart. Transfers out to Cemetery Fund, SAFER Grant Fund and Recreation Activities Fund will increase by the 1% COLA amount for employees paid from those funds.

If City Council proposes a tax rate equal to the ETR of .7570, adds $90,925 to General Fund expenditures for a 1% COLA increase to all City Employees and increases the transfer out to the Cemetery Fund, Safer Grant Fund and Recreation Activities Fund:

Projected Ending Fund Balance	**$3,761,445**
Ideal Fund Balance	**$3,715,049**
Over (Under) Ideal Fund Balance	**$ 46,396**

Option 2 Impact on the General Fund

M&O Rate - .5835 I&S Rate - .1765

Tax Rate	Estimated Beginning Fund Balance	FY 2011 Projected Revenues	FY 2011 Projected Expenditures	Projected Ending Fund Balance	Ideal Fund Balance	Over/(Under) Ideal Fund Balance
.7600	4,725,957	14,456,731	15,439,626	3,746,062	3,726,415	19,647

Any changes to proposed expenditures will require "Ideal Fund Balance" to be recalculated. Only changes in property tax revenue from those proposed on 7/20/10 are depicted in this chart. Transfers out to Cemetery Fund, SAFER Grant Fund and Recreation Activities Fund will increase by the 1.5% COLA amount for employees paid from those funds.

If City Council proposes a tax rate equal to the current tax rate of .7600, adds $136,387 to General Fund expenditures for a 1.5% COLA increase to all City Employees and increases the transfer out to the Cemetery Fund, Safer Grant Fund and Recreation Activities Fund:

Projected Ending Fund Balance	**$3,746,062**
Ideal Fund Balance	**$3,726,415**
Over (Under) Ideal Fund Balance	**$ 19,647**

Calculation of Appraisal District Fees

- Based on the total tax levy of each entity served.
  - Divide entity tax levy by total tax levy of all entities.
- Multiply percent calculated above for each entity by the total Appraisal District Budget.
- Equates to the fee for each entity.
- Appraisal District Fees are paid to both Lampasas Appraisal District and Coryell Appraisal District.
- Coryell is projecting a minor increase – City's Cost estimated to be $165,464 in FY 2011 from $163,831 in FY 2010 (1% increase).
- Lampasas is projecting a slight increase – City's Cost estimated to be $3,498 in FY 2011 from $3,310 in FY 2010 (5.7% increase).

Questions?

Drainage Fund

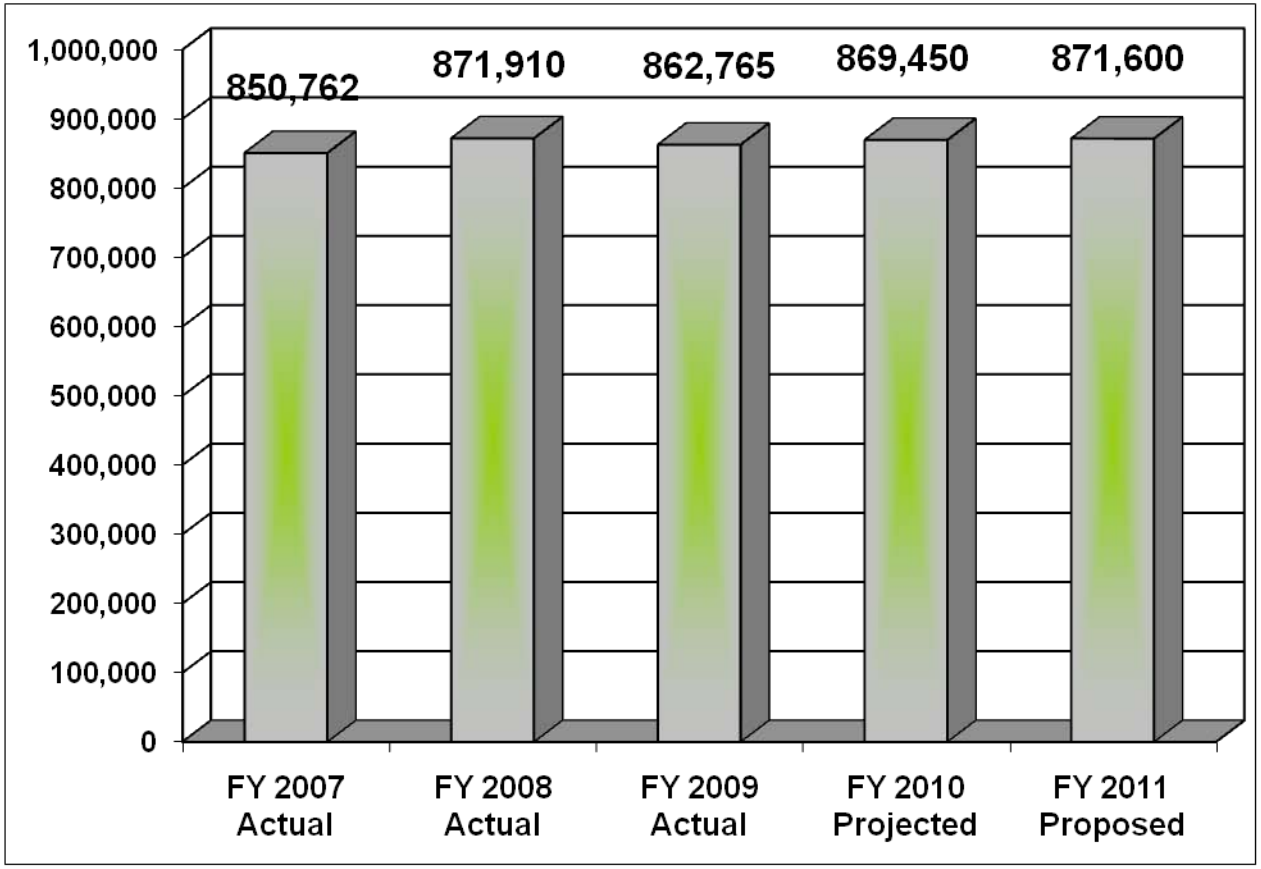
FY 2011 Proposed Budget

Drainage Fund Balance

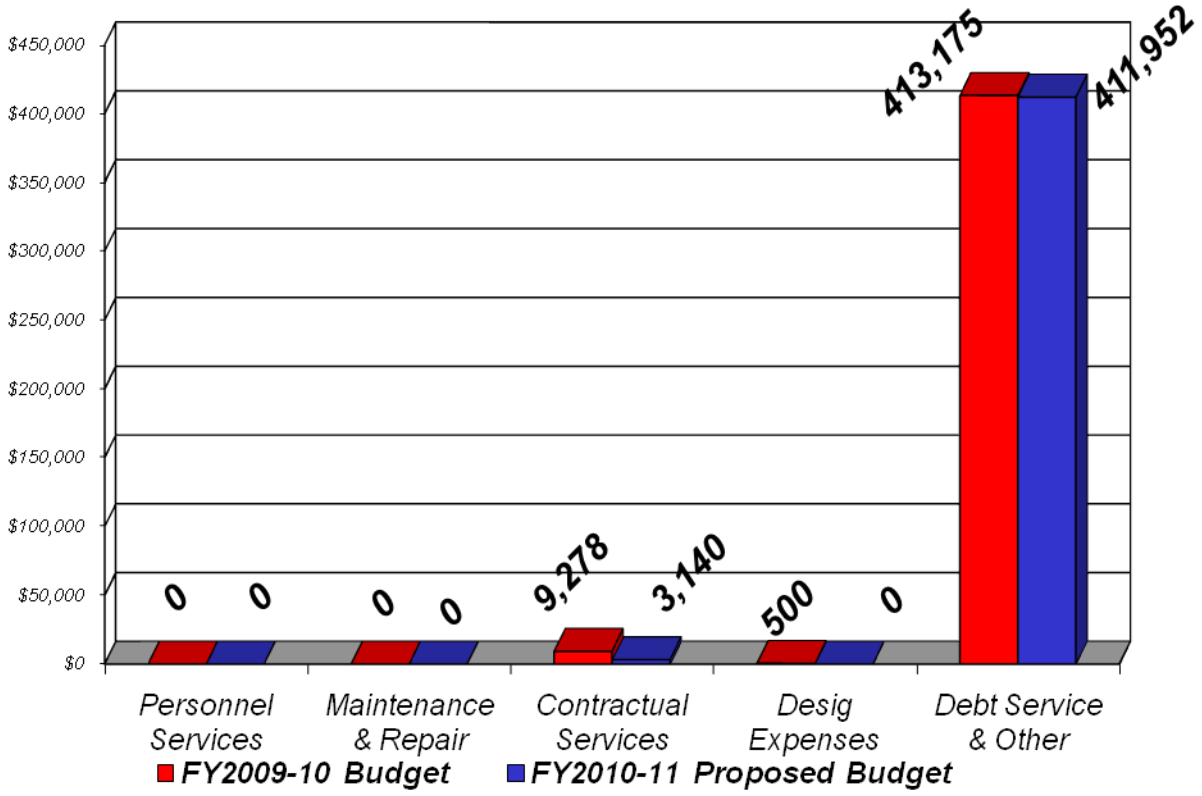
Estimated Fund Balance 10/01/2010	$ 467,888
Estimated Revenue for FY 2011	871,600
Total Funds Available	1,339,488
Estimated Expenses for FY 2011	932,358
Projected Ending Fund Balance	$407,130

*Ideal Fund Balance does not apply

Drainage Fund Revenues



Non-Departmental
Expense Comparison - By Category



Non-Departmental
Significant Budget Changes

- **Contractual Services**
  - In FY 09-10 funded portion of Annual audit. In FY 10-11 audit not budgeted.
- **Debt Service and Other**
  - Administrative Reimbursement decreased by $22,864.
  - Debt Service payments include an increase of $21,641.

Changes to Proposed Budget?

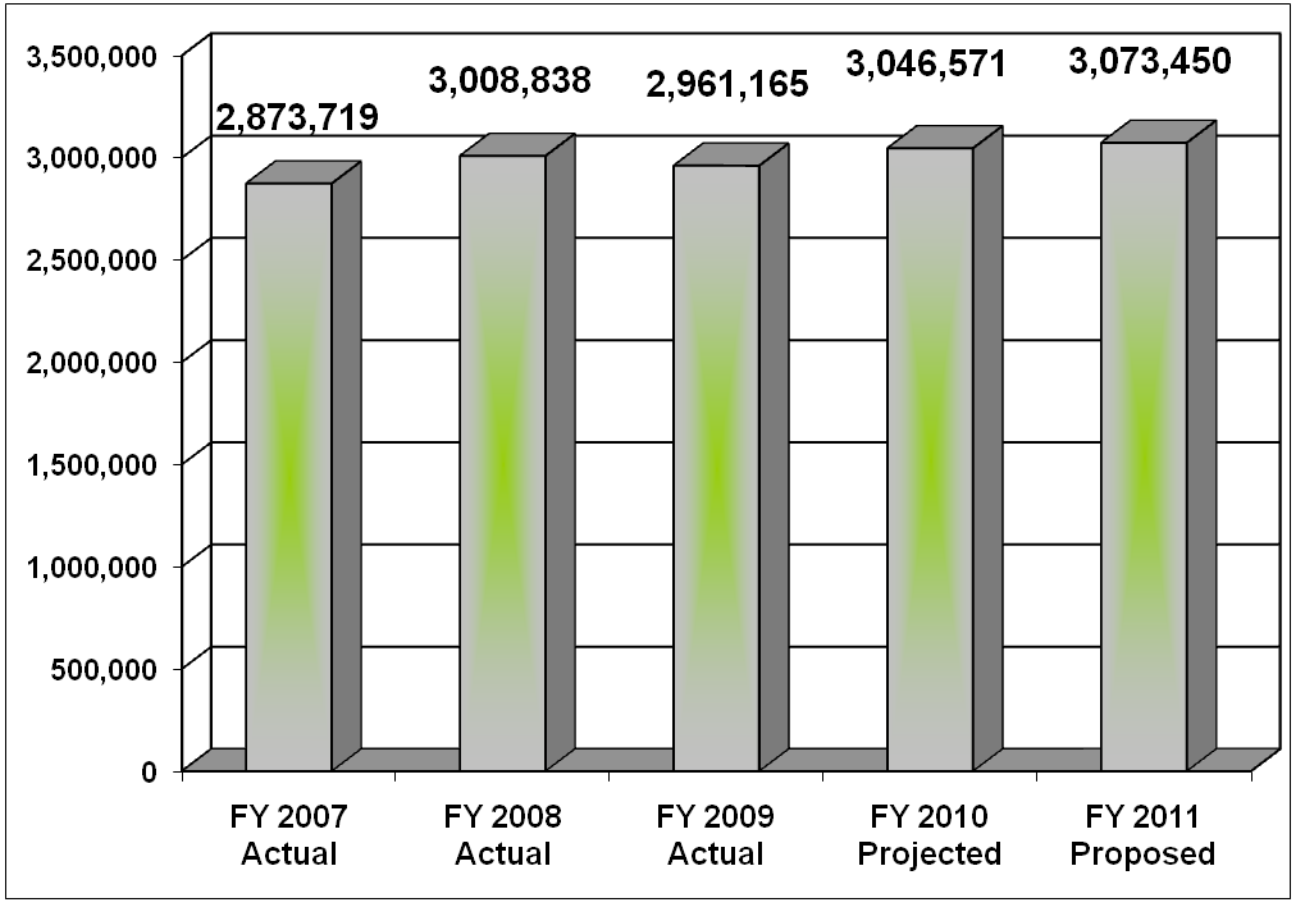
Solid Waste Fund

FY 2011 Proposed Budget

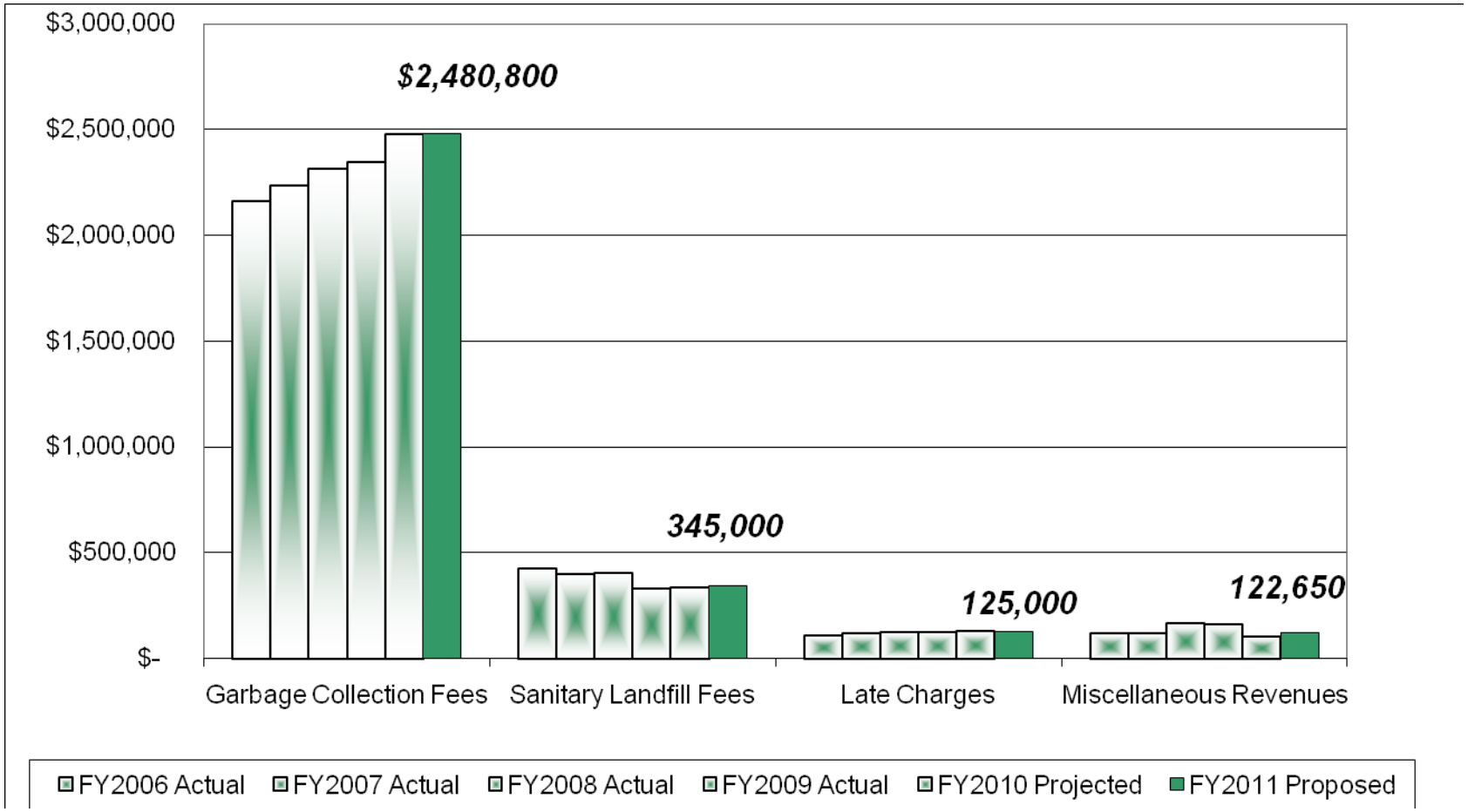
Solid Waste Fund Balance

Estimated Fund Balance 10/01/2010	$ 806,954
Estimated Revenue for FY 2011	3,073,450
Total Funds Available	3,880,404
Estimated Expenses for FY 2011	3,143,406
Projected Ending Fund Balance	$736,998
Ideal Fund Balance	$711,276
Over/(Under) Ideal Fund Balance	$25,722

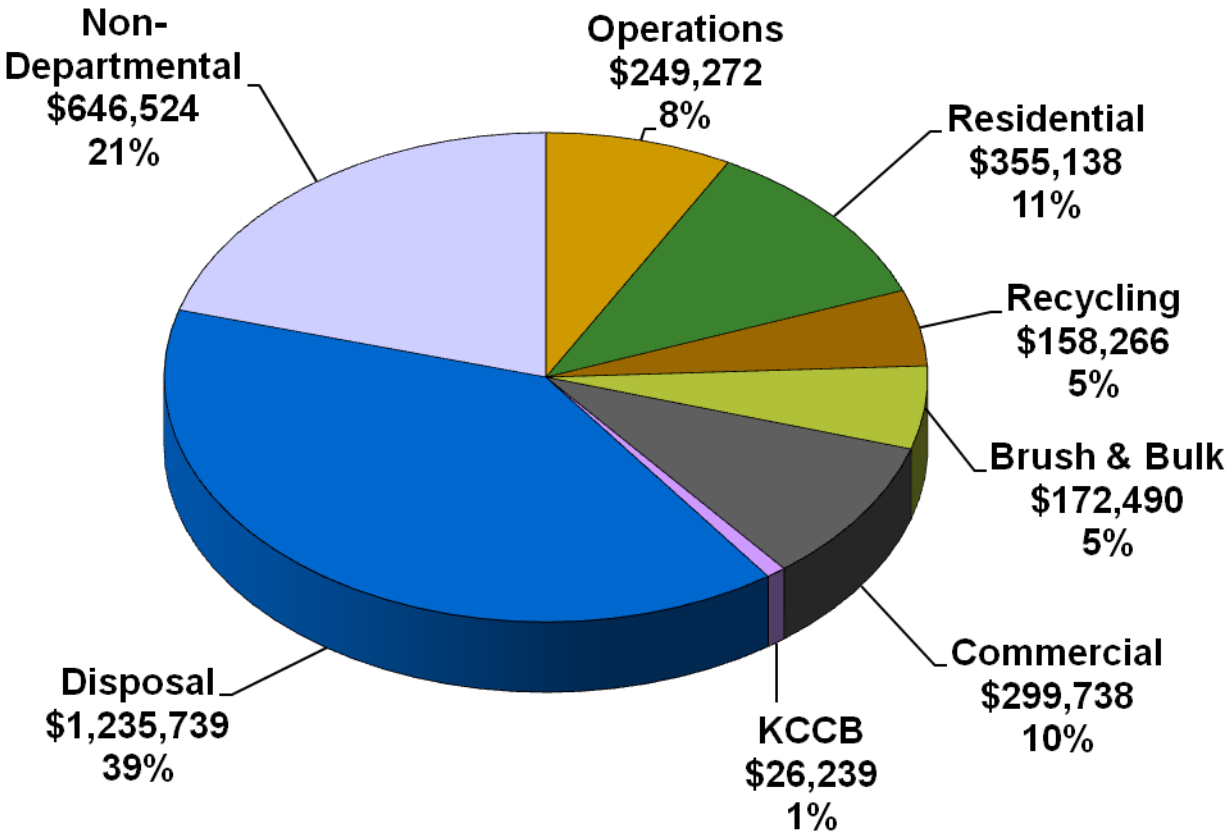
Solid Waste Fund Revenues



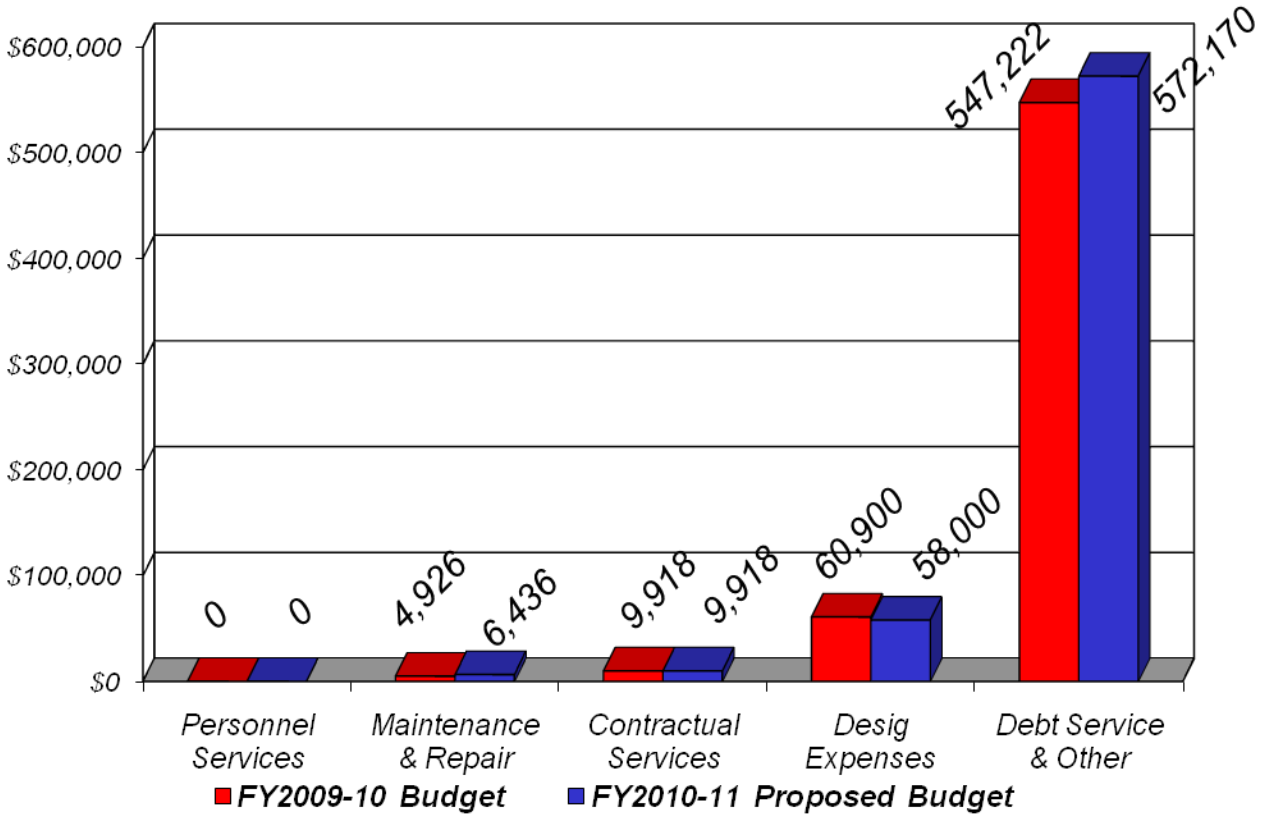
Solid Waste Fund
Revenue Comparison – By Source



Solid Waste Fund
Expense Comparison - By Function



Non-Departmental
Expense Comparison - By Category



Non-Departmental
Significant Budget Changes

- **Debt Service and Other**
  - Administrative Reimbursement remains at $428,000.
  - Debt Service payments include an increase of $24,948.

Changes to Proposed Budget?

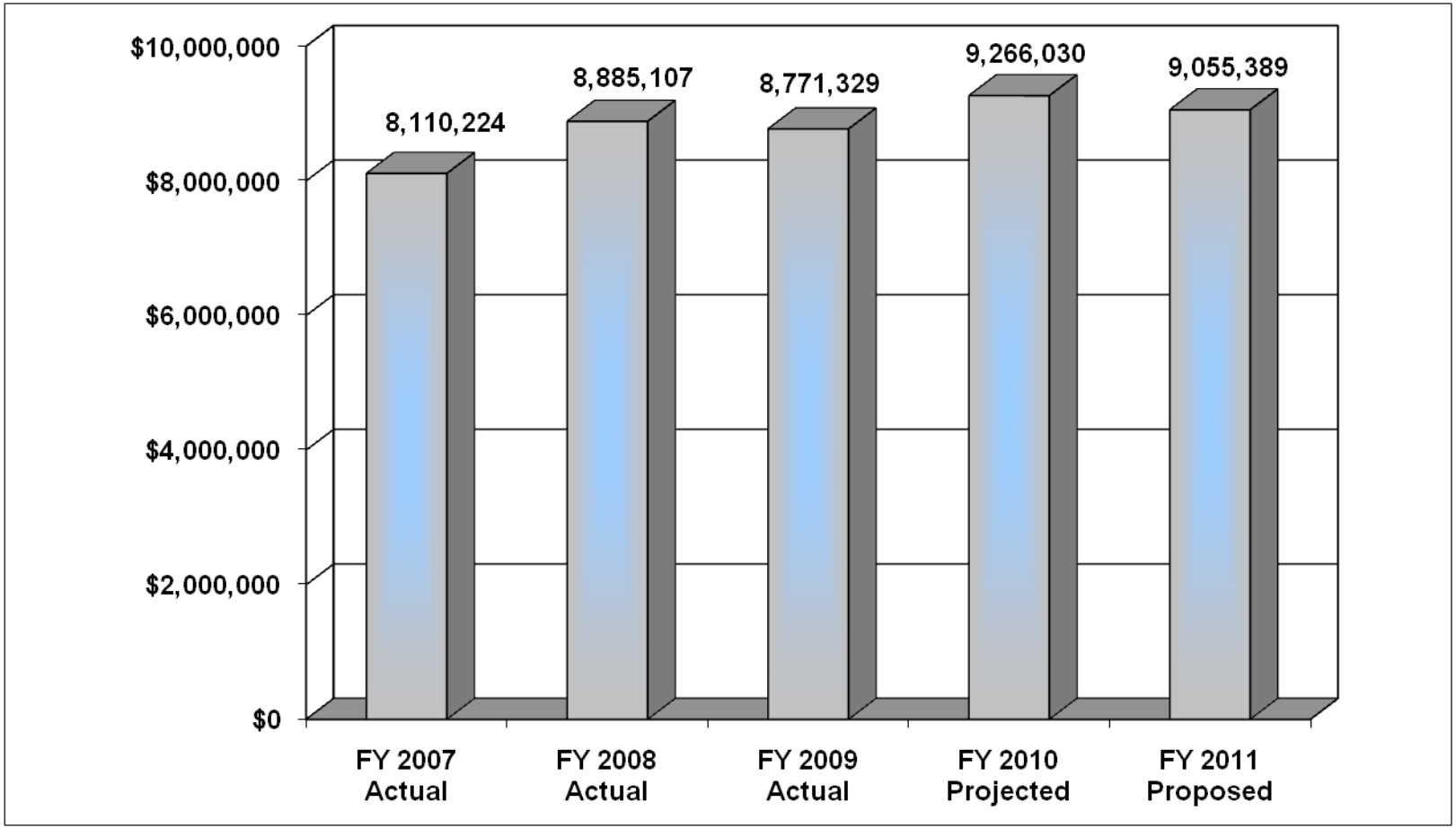
Water & Sewer Fund

FY 2011
Proposed Budget

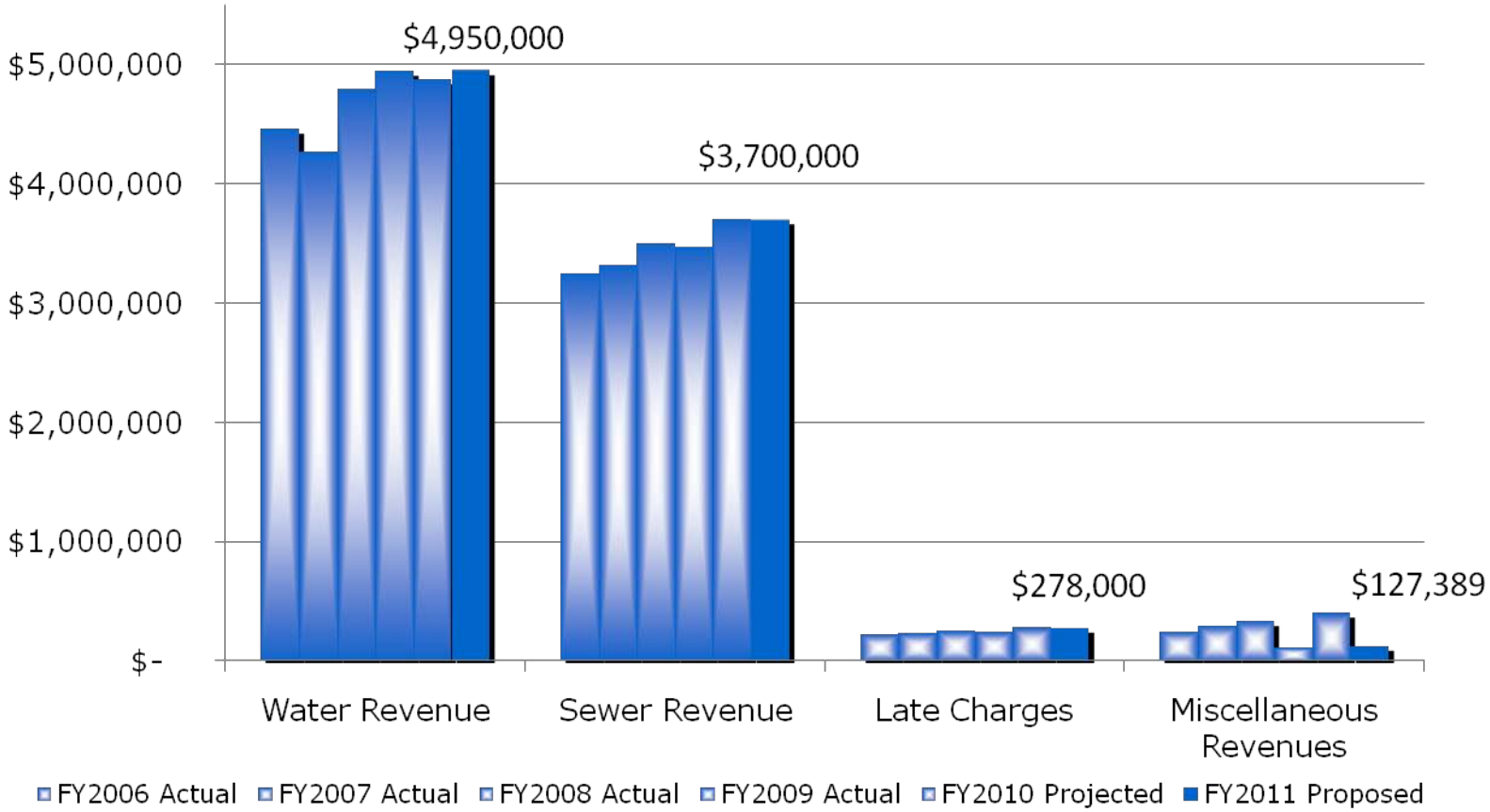
Water & Sewer Fund Balance

Estimated Fund Balance 10/01/2010	$2,218,541
Estimated Revenue for FY 2011	9,055,389
Total Funds Available	11,273,930
Estimated Expenses for FY 2011	9,991,616
Projected Ending Fund Balance	$1,282,314
Ideal Fund Balance	$1,798,458
Over/(Under) Ideal Fund Balance	($516,145)

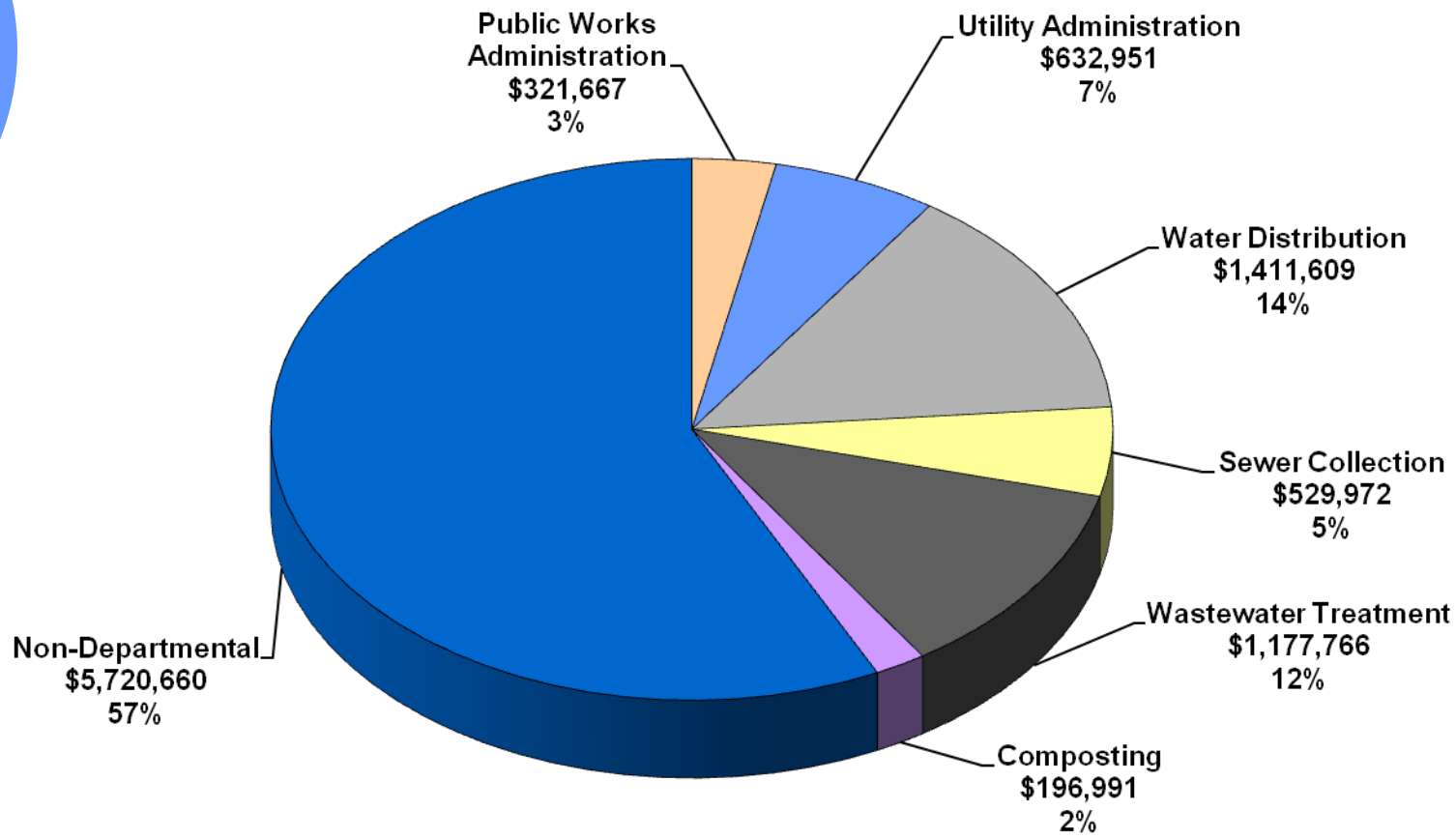
Water & Sewer Fund Revenues



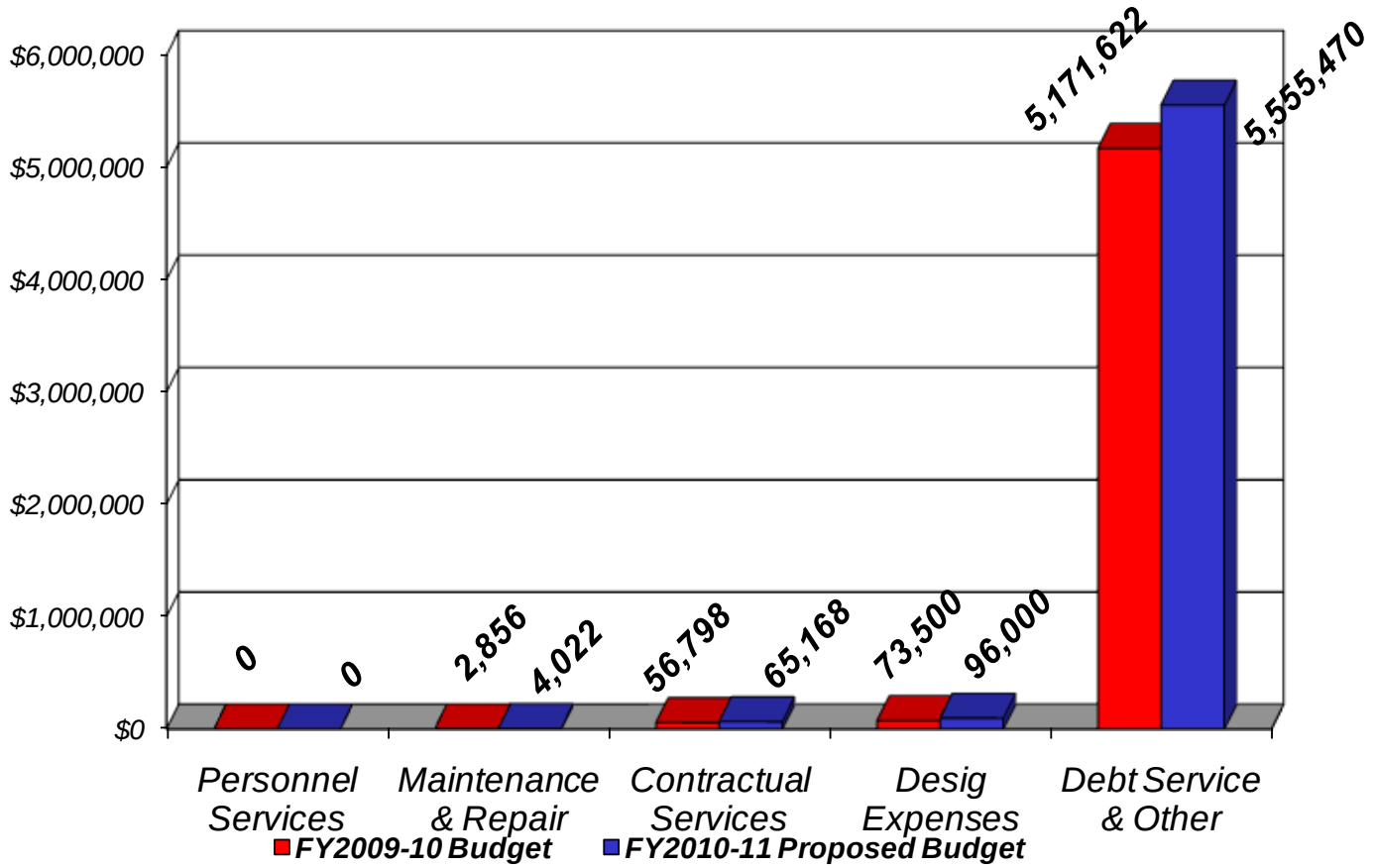
Water & Sewer Fund
Revenue Comparison – By Source



Water & Sewer Fund
Expense Comparison - By Function



Non-Departmental
Expense Comparison - By Category



Non-Departmental Significant Budget Changes

- **Contractual Services**
  - Includes funding for the Storage at old Police Department Building.
- **Debt Service and Other**
  - Administrative Reimbursement is maintained at $742,500.
  - Water Purchases increased from $1,995,100 to $2,029,975.
  - Debt Service payments includes an increase of $389,123.

Changes to Proposed Budget?

CITY OF COPPERAS COVE
CITY COUNCIL REGULAR MEETING MINUTES
August 3, 2010 – 7:00 P.M.

A. CALL TO ORDER

Mayor John Hull called the regular meeting of the City Council of the City of Copperas Cove Texas to order at 7:00 p.m.

B. INVOCATION AND PLEDGE OF ALLEGIANCE

Reverend Matthew Moore, Copperas Cove First Baptist Church, gave the Invocation and Mayor Hull led the Pledge of Allegiance.

C. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Jim Schmitz
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Charles E. Zech, City Attorney
Jane Lees, City Secretary

D. ANNOUNCEMENTS

Council Member Smith stated that the Golf Association spent $1,300 to refurbish the restroom at the No. 5 hole at the Golf Course.

Council Member Kent thanked everyone who came to the Council Meeting as well as the citizens who watch the meeting on television. He asked everyone to continue to come to meetings and that it is important that the City Council hears from them.

E. PUBLIC RECOGNITION

1. Oath of Office – Jim Schmitz, Position 6. ***F.W. "Bill" Price, Municipal Judge***

F.W. "Bill" Price, Municipal Court Judge, administered the Oath of Office to Jim Schmitz, Council Member Position 6. Mr. Schmitz was election in a Special Election on July 20, 2010 to fill a vacancy on the City Council for Position 6, which runs through June 2011.

2. Employee Service Awards. ***Andrea M. Gardner, City Manager***

Andrea M. Gardner, City Manager, presented the following August 2010 recipients with their pins:

- Lenora Couch, Senior Records Clerk Police Department – 15 years
- Daniel Austin, Police Lieutenant – 25 years

3. Retirement Recognition - Daniel “Danny” L. Austin, July 31, 2010

- City of Copperas Cove. Andrea M. Gardner, City Manager, presented Lt. Austin with an Honorably Retired ID Card and a picture. She thanked Lt. Austin for his years of service for the City.
- Citizens Police Academy Alumni Association. Dorothy McClure, President of the Association, presented Lt. Austin with a Certificate for Lifetime Membership to the Association, an Association Tee-shirt, and a 10-year Association Anniversary Pin, along with an engraved clock. Many Association members were present.
- Crime Stoppers. Al Castillo presented a gift on behalf of Crime Stoppers. Many Crime Stoppers members were present.

Lt. Danny Austin commented that of all the retirement events he has had in his honor during the last few weeks, this one was the hardest. He said that he developed many great friendships with many, many people. The Alumni Association is a great group of people and works very hard for the City. He said he would try to be around as much as he could to assist them. He said that Crime Stoppers is a great bunch of folks too, along with the Citizens Fire and Public Safety group. He thanked everyone for helping make his job easier through the years. He thanked Marty Smith and Betty Price of the Chamber for their assistance through the years with events like Rabbit Fest and National Night Out. He thanked them for always saying “Yes” every time he needed help. He thanked Chief Molnes, Deputy Chief Heintzelman, Lt. Eddie Wilson, Cheryl Forester, Kelli Sames and the City Council for everything, saying that “it was a good ride.”

Mayor Hull announced that the City received a certificate on July 27, 2010 from Fort Hood USO. The certificate thanked the City for its dedication and loyalty to the USO Mission and for supporting the Soldiers and Families of Fort Hood.

F. CITIZENS’ FORUM – None.

G. CONSENT ITEMS

1. Consideration and action on approving the minutes from the workshop council meeting on July 20, 2010. ***Stefanie Brown, Deputy City Secretary***

2. Consideration and action on approving the minutes from the regular council meeting on July 20, 2010. ***Stefanie Brown, Deputy City Secretary***

3. Consideration and action on award of Bid No. 2010-09-42 for dry cleaning services for police uniforms. ***Eddie Wilson, Police Lieutenant***

Council Member Kent made a motion to approve G-1, G-2, and G-3 as presented. Council Member Smith seconded the motion, and with a unanimous vote, motion carried.

H. PUBLIC HEARINGS/ACTION

1. Public hearing and action on a Petition for Annexation by the Copperas Cove Economic Development Corporation. ***Wesley Wright, P.E., City Engineer***

Wesley Wright, City Engineer, gave an overview of agenda item H-1.

Mayor Hull opened the public hearing at 7:39 p.m.

Speaking for: Council Member Kent asked what will property be used for. Mr. Wright said that the property is not currently zoned and no requests have been made at this time, therefore, it is unknown what the property will be used for.

Polo Enriquez, Executive Director of the CCEDC stated that the Board of Directors have a meeting scheduled on August 10, 2010 to discuss options on zoning requests.

Speaking Against: None.

Mayor Hull closed the public hearing at 7:44 p.m.

Council Member Schmitz made a motion to accept the Petition for Annexation by the Copperas Cove Economic Development Corporation. Council Member Seffrood seconded the motion, and with a unanimous vote, motion carried.

2. Consideration and action on a resolution setting the public hearing dates and times for the annexation of 155.8906 acres of land in Coryell County, Texas being owned by the Copperas Cove Economic Development Corporation and generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove. ***Wesley Wright, P.E., City Engineer***

Wesley Wright, City Engineer, gave an overview of agenda item H-2.

Council Member Schmitz made a motion to approve Resolution No. 2010-27, setting two public hearings for annexation of 155.9006 acres to be held on August 5 and 17, 2010. Council Member Palmer seconded the motion. A roll call vote was taken as follows:

Cheryl L. Meredith	Aye
Charlie D. Youngs	Aye
Gary L. Kent	Nay
Danny Palmer	Aye
Kenn Smith	Aye
Jim Schmitz	Aye
Frank Seffrood	Aye

Motion carried six to one.

The resolution caption is as follows:

RESOLUTION NO. 2010-27

A RESOLUTION TO SET THE PUBLIC HEARING DATES AND TIMES FOR THE ANNEXATION OF 155.8906 ACRES OF LAND IN CORYELL COUNTY, TEXAS BEING OWNED BY THE COPPERAS COVE ECONOMIC DEVELOPMENT CORPORATION AND GENERALLY LOCATED EAST OF CONSTITUTION DRIVE AND SOUTH OF US HIGHWAY 190 TO THE CITY OF COPPERAS COVE.

3. Public hearing on the annexation of 6.8 acres owned by the City of Copperas Cove to the City. ***J. Mike Baker, Fire Chief/EMC***

J. Mike Baker, Fire Chief/EMC, gave an overview of agenda item H-3.

Mayor Hull opened the public hearing at 7:47 p.m.

Speaking for: None.

Speaking Against: None.

Mayor Hull closed the public hearing at 7:48 p.m.

No action taken.

I. ACTION ITEMS

1. Consideration and action on a resolution nominating a candidate(s) to serve on the Board of Trustees of the Texas Municipal League Intergovernmental Risk Pool. ***John Hull, Mayor***

Mayor Hull gave an overview of agenda item I-1, then nominated Frank Seffrood for the position.

Council Member Smith made a motion to approve Mayor Hull's nomination of Frank Seffrood. Council Member Kent seconded the motion, and with a unanimous vote, motion carried.

The resolution caption is as follows:

RESOLUTION NO. 2010-28

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS, TO NOMINATE A CANDIDATE(S) TO SERVE ON THE BOARD OF TRUSTEES OF THE TEXAS MUNICIPAL LEAGUE INTERGOVERNMENTAL RISK POOL.

J. REPORTS FROM OUTSIDE ENTITIES, ADVISORY COMMITTEES AND BOARDS

1. Chamber of Commerce 2nd Quarter Report for 2010. ***Marty Smith, President, Copperas Cove Chamber of Commerce***

Marty Smith, President of the Copperas Cove Chamber of Commerce, presented the 2nd Quarter Report for 2010.

K. ITEMS FOR FUTURE AGENDAS

Council Member Youngs stated that he would be absent from the Special Meeting scheduled for August 31, 2010 and asked if he needed to request an excused absence from the Council. City Attorney Zech stated that the City Charter is very clear in saying that only regularly scheduled meetings of the Council must be excused, therefore it was not necessary to make a request for

the Special Meeting on August 31, 2010. Council Member Schmitz informed the Council at this time that he too, would not be present at the August 31, 2010 Special Meeting.

L. EXECUTIVE SESSION

1. Pursuant to §551.074 of the Open Meetings Act. *Tex. Gov't Code,* Council will meet in Executive Session to deliberate the evaluation and duties of the City Manager, Andrea M. Gardner.

2. Pursuant to §551.074 of the Open Meetings Act. *Tex. Gov't Code,* Council will meet in Executive Session to deliberate the evaluation and duties of the City Secretary, Jane Lees.

The Council adjourned to Executive Session at 7:57 p.m.

M. RECONVENE INTO OPEN SESSION FOR POSSIBLE ACTION RESULTING FROM ANY ITEMS POSTED AND LEGALLY DISCUSSED IN EXECUTIVE SESSION

The council reconvened into open session at 9:01 p.m. Mayor Hull announced that there was no action to be taken as a result of the Executive Session discussion.

N. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 9:02 p.m.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

CITY OF COPPERAS COVE
CITY COUNCIL SPECIAL MEETING MINUTES
August 5, 2010 – 6:00 P.M.

A. CALL TO ORDER

Mayor John Hull called the special meeting of the City Council of the City of Copperas Cove Texas to order at 6:00 p.m.

B. INVOCATION AND PLEDGE OF ALLEGIANCE

Council Member Frank Seffrood gave the Invocation and Mayor Hull led the Pledge of Allegiance.

C. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Jim Schmitz
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Jane Lees, City Secretary

D. ANNOUNCEMENTS

E. PUBLIC RECOGNITION – None.

F. CITIZENS' FORUM – None.

G. CONSENT ITEMS – None.

H. PUBLIC HEARINGS/ACTION

1. Public hearing on Fiscal Year 2010-2011 City Manager's Proposed Budget. ***Imelda Rodriguez, Director of Financial Services***

Imelda Rodriguez, Director of Financial Services, gave an overview of agenda item H-1.

Mayor Hull opened the public hearing at 6:07 p.m.

Speaking for: Council Member Kent encouraged citizens to take part in the budget proceedings.

Speaking Against: None.

Mayor Hull closed the public hearing at 6:08 p.m.

No action taken.

2. Public hearing on the annexation of 155.8906 acres of land in Coryell County, Texas being owned by the Copperas Cove Economic Development Corporation and generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove. ***Wesley Wright, P.E., City Engineer***

Wesley Wright, City Engineer, gave an overview of agenda item H-2.

Mayor Hull opened the public hearing at 6:09 p.m.

Speaking for: Council Member Youngs stated that this annexation is an integral part of getting the east side of the City completed.

Speaking Against: None.

Mayor Hull closed the public hearing at 6:10 p.m.

No action taken.

I. ACTION ITEMS – None.

J. REPORTS FROM OUTSIDE ENTITIES, ADVISORY COMMITTEES AND BOARDS – None.

K. ITEMS FOR FUTURE AGENDAS – None.

L. EXECUTIVE SESSION – None.

M. RECONVENE INTO OPEN SESSION FOR POSSIBLE ACTION RESULTING FROM ANY ITEMS POSTED AND LEGALLY DISCUSSED IN EXECUTIVE SESSION

N. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 6:12 p.m.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

CITY OF COPPERAS COVE
CITY COUNCIL SPECIAL MEETING MINUTES
August 5, 2010 – 6:30 P.M.

A. CALL TO ORDER

Mayor John Hull called the special meeting of the City Council of the City of Copperas Cove Texas to order at 6:30 p.m.

B. INVOCATION AND PLEDGE OF ALLEGIANCE – None.

C. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Jim Schmitz
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Jane Lees, City Secretary

D. ANNOUNCEMENTS – None.

E. PUBLIC RECOGNITION – None.

F. CITIZENS' FORUM – None.

G. CONSENT ITEMS – None.

H. PUBLIC HEARINGS/ACTION – None.

I. ACTION ITEMS

1. Consideration and action to adopt the tax rate for fiscal year 2010-11 on the agenda of a future meeting. ***Imelda Rodriguez, Director of Financial Services***

Imelda Rodriguez, Director of Financial Services, gave an overview of agenda item I-1.

Council Member Seffrood made a motion to propose a tax rate of .76 cents per $100 of taxable value and set a date to adopt a tax rate for the 2010-11 fiscal year to be held on September 7, 2010 at City Hall at 7:00 p.m. Council Member Kent seconded the motion and a roll call vote was taken:

Cheryl L. Meredith	Aye
Charlie D. Youngs	Aye
Gary L. Kent	Aye
Danny Palmer	Aye
Kenn Smith	Aye
Jim Schmitz	Aye
Frank Seffrood	Aye

Motion carried unanimously.

2. Consideration and action on calling for Public Hearings on the proposed tax increase for the 2010-2011 fiscal year to be held on August 17, 2010 and August 31, 2010 at City Hall at 7:00 p.m. ***Imelda Rodriguez, Director of Financial Services***

Imelda Rodriguez, Director of Financial Services, gave an overview of agenda item I-1.

Council Member Smith made a motion to call for Public Hearings on the proposed tax increase for the 2010-2011 fiscal year to be held on August 17, 2010 and August 31, 2010. Council Member Palmer seconded the motion, and with a unanimous vote, motion carried.

J. REPORTS FROM OUTSIDE ENTITIES, ADVISORY COMMITTEES AND BOARDS – None.

K. ITEMS FOR FUTURE AGENDAS – None.

L. EXECUTIVE SESSION – None.

M. RECONVENE INTO OPEN SESSION FOR POSSIBLE ACTION RESULTING FROM ANY ITEMS POSTED AND LEGALLY DISCUSSED IN EXECUTIVE SESSION

N. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 6:37 p.m.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

CITY OF COPPERAS COVE
CITY COUNCIL WORKSHOP MEETING MINUTES
August 5, 2010 – 7:00 P.M.

A. CALL TO ORDER

Mayor John Hull called the workshop meeting of the City Council of the City of Copperas Cove Texas to order at 7:00 p.m.

B. ROLL CALL

John Hull
Cheryl L. Meredith
Charlie D. Youngs
Gary L. Kent
Danny Palmer
Kenn Smith
Jim Schmitz
Frank Seffrood

ALSO PRESENT

Andrea M. Gardner, City Manager
Jane Lees, City Secretary

C. WORKSHOP ITEMS

1. Presentation and discussion of the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

Ms. Gardner clarified an article that was written in yesterday's Killeen Daily Herald by Taylor Short which stated that the Council discussed a tax rate increase at the August 3, 2010 Council Meeting. She stated that the discussion was on a proposed tax increase. She also stated that the current tax rate in the City is .76.

Sarah Kindler, Chair of the Hotel Occupancy Tax Committee, stated that the Committee had received one request for funds. The request came from C.H.A.M.P.S. HOT Bowl. Ms. Kindler said that expenditures from the Hotel Occupancy Tax Fund must meet two criteria. The HOT Bowl met the first required criteria that every expenditure must directly enhance and promote tourism and the convention and hotel industry. The second criteria is that expenditures must clearly fit into one of eight statutory categories. The C.H.A.M.P.S. HOT Bowl application met two of those statutory categories: No. 3 - Paying for advertising, solicitations and promotions that attract tourist and conventions delegates to the city or its vicinity; and No. 6 – Funding costs in certain counties to hold sporting events that substantially increase hotel activity cities within counties of under one million population.

The Committee recommends the requested amount of $30,000.

Marty Smith, President of the Copperas Cove Chamber of Commerce and Betty Price, Vice President, made a presentation which is attached and made a part of these minutes.

The Chamber requested $200,000.

Robert Ator, Executive Director of The HOP, made a presentation which is attached and made a part of these minutes.

The HOP is requesting $16,725 for operating funds and $8,321 for shelters, for a total of $25,046.

2. Provide direction to the City Manager regarding the Fiscal Year 2011 Proposed Budget. ***Andrea M. Gardner, City Manager***

The Council concurred to reduce the amount requested from the Chamber of Commerce to $177,850, in order to leave a desired fund balance of $35,000 in the Hotel/Motel Occupancy Tax Fund.

The Council concurred to award $30,000 to C.H.A.M.P.S HOT Bowl in the proposed budget.

Council Member Kent requested that the City Manager conduct a study comparing City owned cell phones/plans vs. a cell phone allowance for employees. This plan would not be considered until the current cell phone contract, was up.

D. ADJOURNMENT

There being no further business, Mayor Hull adjourned the meeting at 8:09 p.m.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

Copperas Cove
Chamber of Commerce & Visitors Bureau
The Front Door of the City

Copperas Cove Tourism & Visitors Bureau FY 2010-2011 HOT Funds Request

Copperas Cove Chamber of Commerce

Tourism & Visitors Bureau

These are two separate businesses with two separate funding sources

- **The Chamber is funded by membership, events, fundraising & sponsorship**

- **The Visitors Bureau is funded by Hotel Motel Tax funds**

Copperas Cove Chamber of Commerce
Mission Statement

The Copperas Cove Chamber is organized to advance the general welfare and prosperity of the Copperas Cove area so that its citizens and all areas of its business community shall prosper. All necessary means of promotion shall be provided and particular attention and emphasis shall be given to the economic, civic, commercial, cultural, industrial and educational interests of the area.

Copperas Cove Chamber of Commerce

Key Activities

Funding: Membership---Events---Fundraising---Sponsorship
Membership: Cove & Surrounding area businesses
Promote Businesses: Shop Cove---Website listings---Promotions---Ribbon Cuttings---Ground Breaking Ceremonies---Grand Openings---Mixers---Email Campaigns---Military Affairs Dinners---AUSA---Fort Hood Events
Promote City: State of the City---Ribbon Cuttings-----Political Forums--Ground Breakings Ceremonies--- Building Dedications---Christmas Tree Lighting--- Fishing in the Park---Easter Egg Hunt---Polar Bear Swim—AUSA---Surrounding Chambers---Civic Organizations---Military Affairs Dinners---Website Support--- National Night Out---Fort Hood Events
Promote CCISD: Sponsorship & Promotion---Email Support---Word of Mouth Promotion---Military Affairs Dinners—Website Support

Copperas Cove
Chamber of Commerce & Visitors Bureau
The Front Door of the City

Copperas Cove Tourism & Visitors Bureau

Copperas Cove
Tourism & Visitors Bureau

Mission Statement

The Mission of the Copperas Cove Visitors Bureau is to enhance economic and social growth for the benefit of its members, visitors, and the residents of our community. The Visitors Bureau works to market develop and coordinate tourism events and activities that will increase awareness of Copperas Cove as a destination, stimulate overnight stays and enhance visitor spending to ultimately produce a substantial impact for our community.

Copperas Cove Tourism & Visitors Bureau

Key Activities

Bike / Run Central Texas: TBI Bike Race---Cove House Bike Rally-Fort Hood Challenge---Tough Cookie---Jack Rabbit Run---Gallop or Trot---Summer Fun Run

Rabbit Fest: Held Annually for 30 Years

Krist Kindl Markt: Back to Chamber in 2010

Hood Howdy: Held twice a year at Fort Hood

Parades: Rabbit Fest & Lighted Christmas Parade

Joint Image: In partnership with CCISD & EDC to promote city jointly throughout Army installations

Cove Opry: Held monthly promoting the Arts in Copperas Cove became part of the Chamber in 2010 / 2011

Promote City, CCISD & EDC

Hotel Occupancy Tax Fund
State Requirements – Tax Code Chapter 351

In order to qualify to receive Hotel Occupancy Tax Funds criteria #1 must be met.

Upon meeting criteria #1; the expenditures must qualify in one of the 8 remaining categories.

- **Criteria #1: First, every expenditure must DIRECTLY enhance and promote tourism AND the convention and hotel industry.**
  a. Funding the establishment, improvement, or maintenance of a convention center or visitor information center
  b. Pay the administrative costs for facilitating convention registration
  c. Paying for advertising, solicitations, and promotions that attract tourists and convention delegates to the city or its vicinity
  d. Expenditures That Promote the Arts
  e. Funding Historical Restoration or Preservation Programs
  f. Funding costs in our county to hold sporting events that substantially increase hotel activity
  g. Fund the Enhancement or Upgrading of Existing Sports Facilities or Sports Fields for Certain Municipalities
  h. Funding transportation systems for tourists

Copperas Cove
Chamber of Commerce & Visitors Bureau
The Front Door of the City

Copperas Cove Tourism & Visitors Bureau

FY 2010-2011 HOT Funds Request

Copperas Cove Tourism & Visitors Bureau

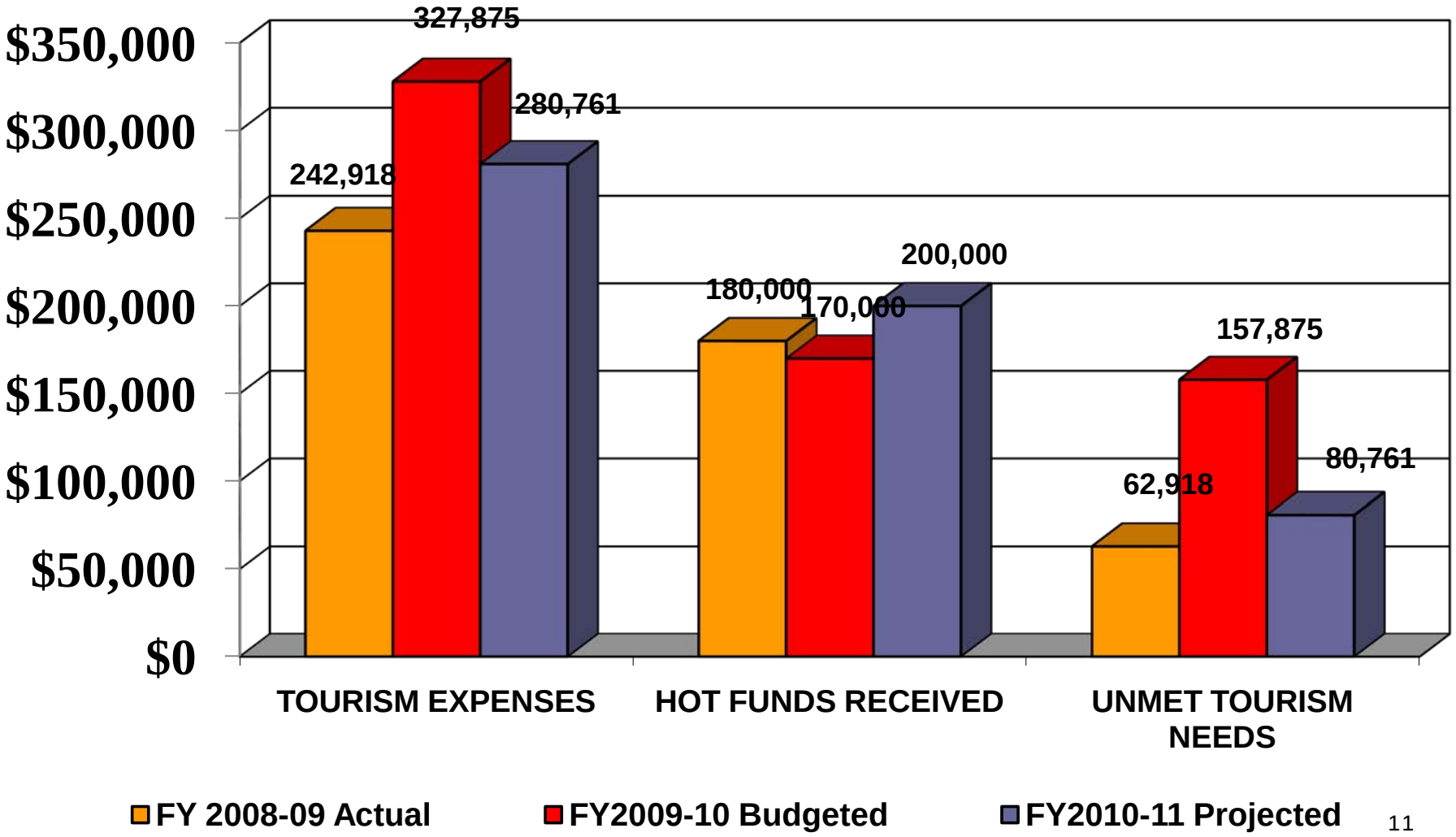
FY 2010-11 Requested Hotel Motel Tax
$200,000
Leaving a Remaining Balance of Unmet Needs
For FY 2010-11 of
$80,761

- In promoting & marketing Copperas Cove & tourism we face many expenses in the following areas:

Advertisement	General & Administrative
Festivals	Entertainment
Events	Promotion

- The unmet needs stated above are Tourism expenditures paid out of the Chamber Operating Fund

Copperas Cove
Tourism & Visitors Bureau
Chamber Tourism Budget Review & Projected



Copperas Cove
Tourism & Visitors Bureau
Request Summary
FY 2010-11

HOT FUNDS REQUEST 2010 – 11	**$200,000**
TOURISM BUDGET 2010 -11	**$285,560**
TOURISM EXPENSE UNMET NEEDS 2010 – 11	**$ 80,761**

the HOP

Central Texas' Regional Public Transit System

The HOP currently operates two fixed routes in Copperas Cove. Route 65 operates throughout Copperas Cove, and Route 100 connects CC (and Route 65) to other HOP routes.

Route 200 serves as a connector route, linking the two urban transit divisions operated by The HOP, thereby providing access for people in the Killeen/Copperas Cove/Harker Heights area to travel to the Temple/Belton area, and vice versa.

Ridership Information

The average number of passengers per service hour for Route 35 for the first 6 months of 2010 compared to the same period of 2009 has grown from 9.42 to 9.98, an increase of almost 5%

Passenger Shelters

The HOP has been awarded funding whereby many passenger shelters can be installed over the next two years. The project is funded in large part with New Freedom funding.

Passenger Shelters (2)

The HOP has completed an Invitation for Bid process, and the specific shelter to be purchased has been selected. The first order for the new shelter has been received. Photos of the shelter follow.

PHOTO OF PERFORATED STEEL WALL

PHOTO OF PROPOSED ROOF
STYLE AND BENCH STYLE

HOW MANY SHELTERS IN COPPERAS COVE?

Based on estimated construction costs, The HOP estimates at least 14 New Freedom shelters can be installed in CC.

WHERE IN CC?

Based on surveys, The HOP has developed a tentative list that includes the following locations:

- Casa Drive
- HEB
- Williams & MLK
- Leonard & Sunshine

WHERE IN CC? (2)

The previous list for New Freedom shelter locations simply highlights a few major stops. An expanded list will be prepared and presented through the appropriate City office before installations actually begin. There are several other locations at which The HOP staff feels shelters are needed.

WHEN IN CC?

The HOP plans approximately 8-10 shelters for installation in the summer of 2010. The remainder of the shelters may be planned for 2011, so every reasonable effort can be made to place the shelters in the best locations.

PLANNING PROCESS

1. Review list with City staff for ROW issues, practicality
2. Finalize list and present in workshop
3. Assign to Contractor for installation

QUALITY PROJECT

The HOP has selected a construction firm for New Freedom shelter installation. All New Freedom shelters will be fully ADA accessible and will meet Texas Accessibility Standards.

FUNDING REQUEST

The HOP is requesting each city provide half of the required 20% local match for the shelter project. HCTD is providing half the local match, sharing the local match with the cities. The share for each city is based on the number of service hours provided in that city.

SHELTER FUNDING

- Total funding for the shelters in Copperas Cove = $238,000
- Total funding provided by grant = $190,400
- Total funding provided by HCTD = $24,075
- Total funding requested from Copperas Cove = $23,525

THREE YEAR PLAN

The HOP is asking Copperas Cove to make the total contribution for the shelters of $23,525 over 3 years:

- Year One = $8,321 (FY 2010-11)
- Year Two = $7,602 (FY 2011-12)
- Year Three = $7,602 (FY 2012-13)

OPERATING FUNDS

Each year, The HOP requests funding from each city based on the percentage of service hours provided in that city. For the current fiscal year (2009-2010) for Copperas Cove, The HOP requested $21,989 for daily operation of the system.

For the next fiscal year, The HOP is requesting $16,725 for operating funds.

TOTAL REQUESTED

For the upcoming fiscal year, The HOP is requesting from the City of Copperas Cove the following total funding:

Operating =	*$ 16,725*
Shelters =	*$ 8,321*
TOTAL =	***$ 25,046***

the HOP

Central Texas' Regional Public Transit System

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. G-8

Contact –Ken Wilson Director of Community Services, 542-2719
kwilson@ci.copperas-cove.tx.us

SUBJECT: **Consideration and action on authorizing the City Manager to enter into an Inter-local Agreement with the Copperas Cove Independent School District to share facilities for recreational purposes.**

---

1. BACKGROUND/HISTORY

The City of Copperas Cove and the Copperas Cove Independent School District have an agreement for sharing athletic and recreational facilities for the betterment of the community. The City and the District have determined that it is in the best interest of taxpayers' funds and overall efficiency of service delivery to use both facilities.

The Parks and Recreation Department utilizes CCISD practice fields, gymnasiums, the soccer field at Ave. E, a track, and computer labs for city organized sports leagues and recreational classes throughout the year.

The District utilizes the Civic Center, Ogle Tree Gap Park, Allin House, City Park and South Park pools, softball fields, Hills of Cove Golf Course, and the use of Channel 10 for District sponsored activities.

2. FINDINGS/CURRENT ACTIVITY

The agreement defines the terms and conditions of the shared facilities. The term of the contract will begin September 1, 2010 and will be for a term of one year. The contract will be reviewed by both agencies in August 2011 for the 2011/2012 agreement. There were minor changes to the agreement only minor word and date changes have been made to the existing agreement. The agreement has been reviewed by the City, the City Attorney and the School District.

3. FINANCIAL IMPACT

Utilization of facilities for District or City sponsored activities is free of charge with the exception of the golf course. The District will pay an annual fee of $4,000 for the use of the golf course and driving range for official golf team use. Upkeep of facilities will be the financial responsibility of each party.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends that the City Council authorize the City Manager to enter into the attached agreement with CCISD to provide shares facilities for city sponsored recreational activities.

INTERLOCAL GOVERNMENT AGREEMENT
TO SHARE FACILITIES

STATE OF TEXAS, COUNTY OF CORYELL

This agreement is entered into on the 1st day of September, 2010 between the City of Copperas Cove, a municipal corporation of the State of Texas, herein called the "City" and the Copperas Cove Independent School District, a public school of the State of Texas, herein called the "District."

WHEREAS, the governing bodies of the City of Copperas Cove and the Copperas Cove Independent School District desire to share facilities with each other for the betterment of the community;

WHEREAS, the City and the District seek to re-affirm their long standing sharing of facility arrangements by formulating a written agreement defining the terms and conditions of shared facilities; and

WHEREAS, the City and the District have determined that in the best interest of taxpayer funds and overall efficiency of service delivery and agreement for sharing facilities is desired.

NOW THEREFORE, THE FOLLOWING TERMS AND CONDITIONS ARE AGREED:

SECTION I
ENTITIES DEFINED

This agreement is applicable only to the legal government entities stated above, and does not apply to organizations associated with, but not legally a part of, each entity. Usage by organizations other than the stated entities must be approved by both the "City" and "District".

SECTION II
DISTRICT FACILITIES AVAILABLE TO THE CITY

Unless specifically stated, the facilities owned by the District that are available to the City free of charge and are covered under this Agreement include the following facilities for the indicated dates and hours:

1) Outdoor Practice Fields at all elementary and intermediate schools year-round, but only after 4:00 p.m. on school days and between the hours of 8:00 a.m. and 8:00 p.m. on all other days. Scheduling subject to standard District policy and availability as coordinated with the Athletic Director.

2) Tennis Courts at all schools, excluding high school athletic annex courts, year-round, but only after 4:00 p.m. on school days and between the hours of 8:00 a.m. and 8:00 p.m. on all other days; scheduling subject to standard District policy and availability as coordinated with the Athletic Director.

3) Up to five (5) gymnasiums at elementary or intermediate schools (selected on a yearly basis), Mondays, Tuesdays, Wednesdays, Thursdays and Saturdays from November 1 to January 29th, and Sunday afternoons from January through March (not to exceed 968 hours per year) if the high school and/or junior high schools do not need gyms for practice or tournament play. Scheduling subject to standard District policy and availability as coordinated with the Athletic Director.

4) The gymnasium at Avenue E Alternative Learning Center. Scheduling subject to standard District policy and availability as coordinated with the Athletic Director.

5) The Soccer Complex at Avenue E alternative Learning Center for games only at times coordinated with Athletic Director.

6) One track (selected yearly) on a year-round basis. Scheduling subject to standard District policy and availability as coordinated with the Athletic Director.

7) The use of a computer lab for adult and senior citizens basic computer instruction for up to 48 hours of use (evening and weekend) per year. Scheduling subject to standard District policy and availability.

SECTION III
CITY FACILITIES AVAILABLE TO THE DISTRICT

Unless specifically stated, the facilities owned by the City that are available to the District free of charge and are covered under this Agreement include the following facilities for the indicated dates and hours:

1) The City Civic Center year-round use; scheduling subject to standard City policy and availability.

2) Turkey Creek Activity Center year-round use; scheduling subject to standard City policy and availability.

3) Allen House year-round use; scheduling subject to standard City policy and availability.

4) City Park and South Park Pools year-round for official swim team use; scheduling subject to availability.

5) Softball field #3, #4, and #5 at the City Park.
* Girls softball field #3 not available mid March through July.
* Adult softball field #5 year-round use scheduling subject to standard City policy and availability.
*Field #4 year-round use scheduling subject to standard City policy and availability.

6) Hills of Cove Golf Course year-round golf program for the official team.
* Unlimited use of golf course and driving range 7 days a week. (Monday through Friday and weekends and holidays after 12:00 p.m. Tee times subject to availability.)
* Use restricted to golf coaches and team members of the High School and Junior High School golf programs, as group or individuals with approved adult supervision.
* Three (3) tournaments per year.
* Cart rental not included.
* Annual fee of $4,000.00 due in September of each year of the contract period.

7) Use of Channel 10 subject to availability.

SECTION IV
ADDITIONAL USAGE

If either the City or the District requests the expansion of the number of hours set forth in this Agreement, or if either the City or the District requests the use of additional facilities not described in Sections II or III of this agreement, facilities may be made available based on mutual agreement, and availability of the facility.

SECTION V
MAINTENANCE OF FACILITIES

Maintenance of facilities, to include repairs, upkeep, and custodial services shall be the responsibility of the entity, which owns the facility. When using the other entity's facility, however, each entity shall agree to leave it in the same condition, as it was when the activity began, and shall endeavor to keep the facility as clean as possible.

SECTION VI
SUPERVISION

In cases where the District is using City facilities under the provisions of this Agreement, such activities shall be considered as District sponsored, be an integral part of the District's instructional program, and shall be under the supervision of District personnel designated by the District.

In cases where the City is using District facilities under the provisions of this Agreement, such activities shall be considered as City sponsored, be an integral part of the City's program, and shall be under the supervision of City personnel by the city.

SECTION VII
RESPONSIBILITY AND LIABILITY

In cases where the District uses City facilities under the provisions of the agreement, the District agrees to abide by all City rules and regulations while on City property. In addition, the District also agrees to be responsible for any and all claims, which may arise from the usage, and shall hold the City harmless from any liability claims, which may arise from the event. The District also agrees to be responsible for any property damage, which may arise from such usage.

In cases where the City uses District facilities under the provisions of the agreement, the City agrees to abide by all District rules and regulations while on District property. In addition, the City also agrees to be responsible for any and all claims, which may arise from the usage, and shall hold the District harmless from any liability claims, which may arise from the event. The City also agrees to be responsible for any property damage, which may arise from such usage.

SECTION VIII
POINT OF CONTACT

Unless otherwise stated, the point of contact for the District for implementing and scheduling usage under the provisions of this agreement shall be the Deputy Superintendent. All requests to use District facilities from the city must be submitted by the City point of contact in writing (fax, email, etc.), and it shall be his/her responsibility to coordinate the usage with District personnel and issue written approval to such requests. All District requests to use City facilities must originate with the Deputy Superintendent and be in writing.

Unless otherwise stated, the point of contact for the City for implementing and scheduling usage under the provisions of this agreement shall be the Director of Community Services. All requests to use City facilities from the District must be in writing (fax, email, etc.), and it shall be his/her responsibility to coordinate the usage with City personnel, and issue written approval to such requests. All city requests to use District facilities must originate with the Director of Community Services and be in writing.

SECTION IX
ADMINISTRATIVE PROCEDURES AND SCHEDULING

District activities have precedence in usage of district facilities. In order for the City to use District facilities, the City's point of contact shall submit a written request to the District's point of contact. It shall be the District point of contact's responsibility to work with other District personnel to determine if the facility is available, and to work out the scheduling. Once this has been done, the District point of contact shall inform the City in writing within seven (7) days on the status of the request and the determination made, and shall file copies with appropriate District personnel. The District point of contact shall be responsible for monitoring City usage of District facilities in respect to the provisions of this agreement.

City activities have precedence in usage of City facilities. In order for the District to use City facilities, the District's point of contact shall submit a written request to the City's point of contact. It shall be the City point of contact's responsibility to work with other City personnel to determine if the facility is available, and to work out the scheduling. Once this has been done, the City point of contact shall inform the District in writing within seven (7) days on the status of the request and the determination made, and shall file copies with appropriate City personnel. The City point of contact shall be responsible for monitoring District usage of City facilities in respect to the provisions of this agreement.

SECTION X
TERM OF AGREEMENT

This annual Agreement will be reviewed in August by both parties. Effective dates of this Agreement are September 1, 2010 to August 31, 2011.

Either party may terminate this agreement upon thirty (30) days written notice to the other at the following addresses:

City of Copperas Cove
Attn: City Manager
507 S. Main
Copperas Cove, TX 76522

Copperas Cove ISD
Attn: School Superintendent
703 W Ave. D
Copperas Cove, TX 76522

In the event this agreement is terminated in accordance with this section, the City shall refund to the District the fees paid pursuant to Section III (6) of this agreement. Such refund shall be prorated in proportion to the unexpired term remaining under this agreement upon the effective date of termination.

Either party may request re-negotiation of the Agreement with 30 days notice.

Agreement is hereby approved and executed in duplicate originals on this 31st day of August 2010, by the representatives of the City and the District as authorized by their governing bodies.

_____	_____
Andrea Gardner City Manager	Rose Cameron, Ed.D. Superintendent
ATTEST:	ATTEST:
_____	_____
Jane Lees City Secretary	Kathy Blake Secretary to the Superintendent

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. G-9

Contact – Imelda Rodriguez, Director of Financial Services, 547-4221
irodriguez@ci.copperas-cove.tx.us

SUBJECT: **Consideration and action on a resolution accepting the quarterly investment report as presented for the quarter ending June 30, 2010 per the Investment Policy.**

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1. BACKGROUND/HISTORY

The Public Funds Investment Act of Chapter 2256, Texas Government Code, requires investment management reports to be accepted by the governing body. The City's Investment Policy requires that the Investment Officer shall report to City Council no less than on a quarterly basis, a detailed listing of all purchases, sales and payments, and a description of each security held as well as management summary information. The attached exhibits are those reporting requirements for the quarter ending June 30, 2010.

2. FINDINGS/CURRENT ACTIVITY

See attached quarterly investment report.

3. FINANCIAL IMPACT

None.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends that the City Council approve a resolution accepting the quarterly investment report as presented for the quarter ending June 30, 2010 per the Investment Policy.

RESOLUTION NO. 2010-29

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS APPROVING THE INVESTMENT REPORT FOR QUARTER ENDED JUNE 30, 2010.

WHEREAS, Chapter 2256 of the Texas Government Code, commonly known as the "Public Funds Investment Act," requires the Investment Officer of the City to present not less than quarterly a written report of investment transactions for all funds covered for the preceding reporting period to the governing body; and

WHEREAS, This quarterly investment report must be approved quarterly; and

WHEREAS, This reporting is authorized by the Public Funds Investment Act; and

WHEREAS, The Public Funds Investment Act requires the quarterly investment report be presented to the governing body; and

WHEREAS, The attached quarterly investment report complies with the Public Funds Investment Act.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED BY THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS:

Section 1.

That the City of Copperas Cove has complied with the requirements of the Public Funds Investment Act, and the Quarterly Investment Report for quarter ended June 30, 2010 attached hereto as "Exhibit A," is hereby approved as the quarterly investment report for quarter ended June 30, 2010 of the City effective August 17, 2010.

PASSED, APPROVED, AND ADOPTED on this 17th day of August 2010 at a regular meeting of the City Council of the City of Copperas Cove, Texas which meeting was held in compliance with the Open Meetings Act, *Tex. Gov't Code*, §551.001, et.seq. at which meeting a quorum was present and voting.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

APPROVED AS TO FORM:

_____
Denton, Navarro, Rocha
& Bernal, P.C., City Attorney

City of Copperas Cove

Quarterly Investment Report
Ending as of June 30, 2010

City of Copperas Cove, Texas

Quarterly Investment Report

April 1, 2010 – June 30, 2010

The following reports are submitted in accordance with the Public Funds Investment Act (Chapter 2256). The report also offers supplement not required by the Act to fully inform the City Council of the position and activity within the City of Copperas Cove's portfolio of investments. The reports include a management summary overview, detailed holdings report for the end of the period, and a transaction report as well as graphic representations of the portfolio to provide full disclosure to the City Council.

The City of Copperas Cove's portfolio is managed in full compliance with the Public Funds Investment Act, the City's Investment Policy and Strategy and under the strictest safety parameters as set by the City Council.

City of Copperas Cove, Texas

Operating Fund Quarterly Investment Report
April 1, 2010 – June 30, 2010
Portfolio Summary Management Report

This quarterly report is in compliance with the investment policy and strategy as established by the City and the Public Funds Investment Act (Chapter 2256, Texas Government Code).

Portfolio as of March 31, 2010		*Portfolio as of June 30, 2010*	
Ending Book Value	$20,584,718	Ending Book Value	$26,845,212
Ending Market Value	$20,584,718	Ending Market Value	$26,845,212
Unrealized Gain/Loss	$0	Unrealized Gain/Loss	$0
Change in Unrealized Gain/Loss	**$0**	**Change in Unrealized Gain/Loss**	**$0**

Andrea Gardner
City Manager

Stephanie Potvin
Project Accountant

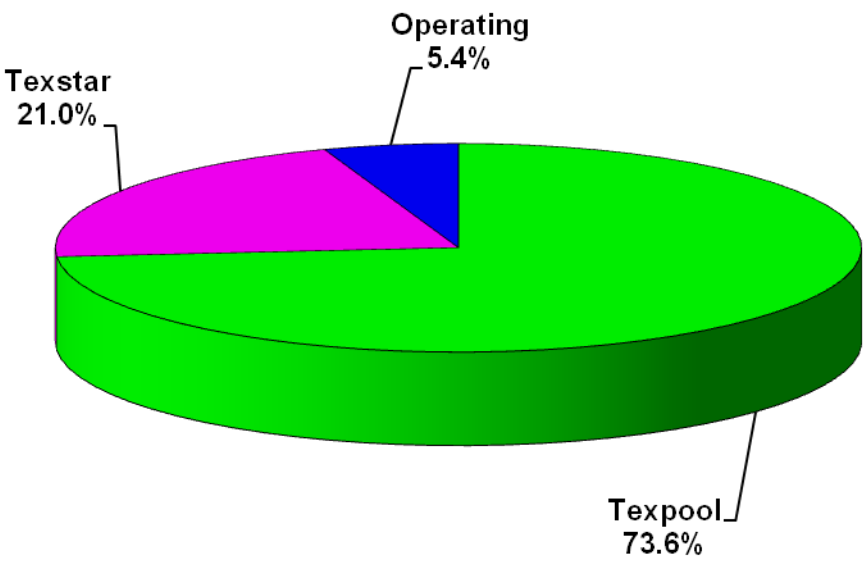
Imelda Rodriguez
Director of Financial Services

Vacant
Assistant Director of Financial Services

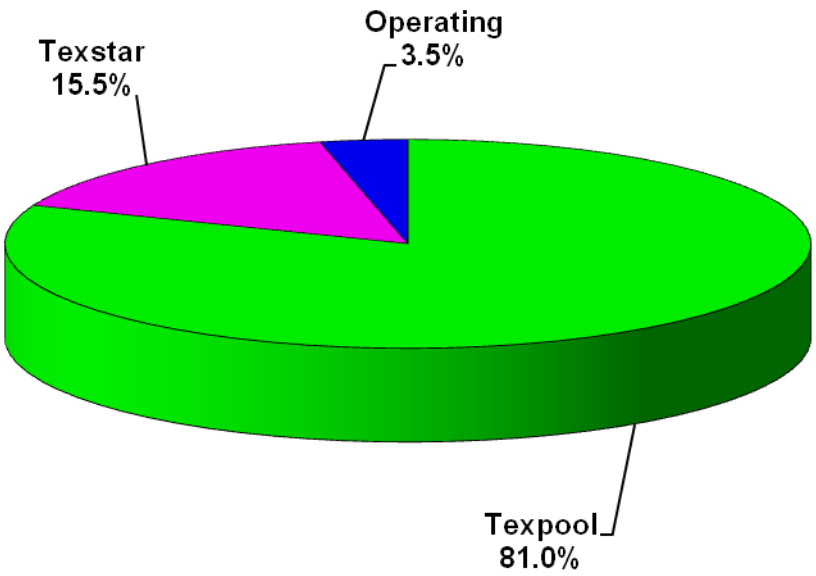
City of Copperas Cove, Texas

Portfolio Allocation Analysis

Fiscal Year 2009-10
2nd Quarter (January - March)



Fiscal Year 2009-10
3rd Quarter (April - June)



CITY OF COPPERAS COVE
MONTHLY COUNCIL REPORT
SCHEDULE OF CASH ACCOUNTS AND INVESTMENTS (By Account)
As of June 30, 2010 (FY 2009-10)

FUNDS IN INVESTMENT POOLS	
TEXSTAR	$ 3,011,799.30
TEXPOOL	22,930,014.51
Subtotal on Funds In Investment Pools	$ 25,941,813.81
CHECKING ACCOUNTS	
Master Account	$847,134.00
Payroll	5,500.05
Rental Rehab	15,290.68
Law Enforcement Block Grant	8,098.33
Pending Forfeitures	24,621.05
Non-Interest Bearing Account - Grants and Court Bonds	211.00
Subtotal Checking Accounts	$900,855.11
SAVINGS ACCOUNTS (Per Quarterly Stmts)	
Subdivision Escrow	2,542.84
Subtotal Savings Accounts	$2,542.84
TOTAL INVESTMENTS & CASH ACCOUNTS	**$26,845,211.76**

SCHEDULE OF CASH ACCOUNTS AND INVESTMENTS (By Fund)
As of June 30, 2010 (FY 2009-10)

FUND	TOTAL CASH & INVESTMENTS
General Fund	$6,028,816.40
Water & Sewer Fund	$4,066,297.40
Solid Waste Fund	$1,035,035.89
Youth Activity Fund	$81,759.47
Drainage Utility Fund	$943,013.34
Cemetery Fund	$8,664.49
General Obligation Interest & Sinking Fund	$1,680,759.65
Municipal Golf Course Fund	($114,762.29)
Small Business Revolving Loan Fund	$82,361.39
Library Gifts & Memorials Fund	$9,521.12
Hotel/Motel Tax Fund	$100,377.97
Animal Shelter Donations Fund	$18,298.21
Police Court Order Fund	$0.00
City-Wide Donations Fund	$58,386.32
City Wide Grants	$134,582.49
FEMA Grant Funds	$9.37
Municipal Court Efficiency	$17,179.67
Municipal Court Technology	$96,352.43
Municipal Court Security	$30,564.49
Police Restricted Fund	$24,722.92
Police Federal Seizure Fund	$2,104.23
Law Enforcement Block Grant Fund	$13,242.49
Fire Department Grant Fund	$9,415.68
Library Grant Fund	$15,634.18
Step Grant	$3,306.65
Tobacco Grant	$713.70
2009 General Obligation (Drainage)	$15,805.26
2009 General Obligation (Tax Supported)	$522,017.78
2009 Tax Notes (Tax Supported)	$567,748.23
2009 Tax Notes (Water & Sewer)	$172,207.22
2009 Tax Notes (Solid Waste)	$405,642.19
2009 Tax Notes (Hotel Occupancy Tax)	$185,887.26
FM 1113 Grant	$50,178.66
2006 Limited Tax Notes	$29,354.84
2008 Tax Note	$511,226.55
2008 Tax Note (Drainage)	$153,257.66
2008A Limited Tax Notes (Tax Supported)	$258,565.63
2008A Limited Tax Notes (Water & Sewer)	$82,610.18
2008A Limited Tax Notes (Solid Waste)	$73,725.91
2008A Limited Tax Notes (Drainage)	$82,328.92
2010 General Obligation (Water & Sewer)	$2,956,094.60
2010 General Obligation (Tax Supported)	$1,411,353.39
2010 Tax Notes (Water & Sewer)	$3,841,319.49
2010 Tax Notes (Tax Supported)	$162,973.87
2009 Tax Notes (W&S)	$0.00
Reliever Route	$109,866.65
2005 Certificates of Obligation (Water Projects)	$0.00
2001 Combination Tax & Revenue C/O's (Capital Equip. & Improvements)	$260,732.39
2001 Combination Tax & Revenue C/O's (Water/Wastewater Phase II CIP)	$0.00
2003 Combination Tax & Revenue C/O's (Capital Equip. & Improvements)	$355,906.50
2003 Combination Tax & Revenue C/O's (Water/Wastewater Phase III CIP)	$278,499.38
2007 Combination Tax & Revenue C/O's (Police Facility)	$11,551.54
TOTAL CASH & INVESTMENTS	**$26,845,211.76**

RECAP OF CASH & INVESTMENTS:	
INVESTMENTS IN TEXPOOL	$ 22,930,014.51
INVESTMENTS IN TEXSTAR	3,011,799.30
CASH IN BANK	$903,397.95
TOTAL CASH & INVESTMENTS	**$ 26,845,211.76**

CITY OF COPPERAS COVE
INVESTMENT SCHEDULE
As of June 30, 2010 (FY 2009-10)

As of June 30, 2010, the City of Copperas Cove's investment portfolio was made up of investments in TEXPOOL, TEXSTAR, and bank deposits with the City's local depository. This portfolio accomplishes the objective of maintaining liquidity while earning a modest yield on invested taxpayers dollars.

TEXPOOL Investments	Market Value 04/01/10	Investments	Redemptions	Accrued Interest	Book Value 06/30/10	Market Value 06/30/10
General Fund	$ 7,589,192.41	$ 858,424.90	$ 2,526,424.90	$ 3,081.02	$ 5,922,273.43	$ 5,922,273.43
Water & Sewer Fund	3,413,978.31	470,000.00	140,000.00	1,700.30	3,745,678.61	3,745,678.61
Solid Waste Fund	887,788.88	120,000.00	80,000.00	435.20	928,224.08	928,224.08
Drainage Utility Fund	796,999.86	82,000.00	-	400.77	879,400.63	879,400.63
Interest & Sinking Fund	1,595,499.61	67,833.28	-	773.92	1,664,106.81	1,664,106.81
Youth Activities Fund	98,727.49	-	31,000.00	36.93	67,764.42	67,764.42
Golf Course Interest & Sinking	39.94	-	-	-	39.94	39.94
Small Business Revolving Loan Fund	77,656.23	1,275.17	-	37.08	78,968.48	78,968.48
Hotel/Motel Fund	90,477.12	37,000.00	43,000.00	34.65	84,511.77	84,511.77
Municipal Court Efficiency	16,016.00	-	-	7.55	16,023.55	16,023.55
Municipal Court Technology	101,295.01	-	7,000.00	47.08	94,342.09	94,342.09
Municipal Court Security	30,455.15	1,000.00	1,000.00	14.42	30,469.57	30,469.57
2008 Tax Supported Note	537,584.54	-	26,610.22	252.23	511,226.55	511,226.55
2008 Tax Supported Note (Drainage)	153,185.42	-	-	72.24	153,257.66	153,257.66
2007 C/O Police Facility	11,546.02	-	-	5.51	11,551.53	11,551.53
2010 General Obligation (Water & Sewer)		3,220,686.18	265,207.31	615.73	2,956,094.60	2,956,094.60
2010 General Obligation (Tax Supported)		1,412,498.82	1,425.00	279.57	1,411,353.39	1,411,353.39
2010 Tax Notes (Water & Sewer)		3,844,443.41	3,885.00	761.08	3,841,319.49	3,841,319.49
2010 Tax Notes (Tax Supported)		163,106.59	165.00	32.28	162,973.87	162,973.87
2001 C/O Bond Fund (Governmental)	260,609.47	-	165.00	122.92	260,567.39	260,567.39
Reliever Route	109,814.87	-	-	51.78	109,866.65	109,866.65
Total TEXPOOL Investments	$ 15,770,866.33	$ 10,278,268.35	$ 3,127,882.43	$ 8,762.26	$ 22,930,014.51	$ 22,930,014.51

TEXSTAR Investments	Market Value 04/01/10	Investments	Redemptions	Accrued Interest	Book Value 06/30/10	Market Value 06/30/10
2003 C/O Project Fund (Governmental)	$ 355,746.24	$ -	$ -	$ 160.26	$ 355,906.50	$ 355,906.50
2003 C/O Project Fund (W&S Phase III)	279,232.05	-	858.38	125.71	278,499.38	278,499.38
2005 Tax Notes - Police Building Project	46,340.75	-	17,002.02	16.11	29,354.84	29,354.84
2008A Limited Tax Notes (Tax Supported)	265,473.95	-	7,026.07	117.75	258,565.63	258,565.63
2008A Limited Tax Notes (Water & Sewer)	92,571.79	-	10,000.00	38.39	82,610.18	82,610.18
2008A Limited Tax Notes (Solid Waste)	73,692.71	-	-	33.20	73,725.91	73,725.91
2008A Limited Tax Notes (Drainage)	82,291.85	-	-	37.07	82,328.92	82,328.92
2009 General Obligation (Drainage)	102,500.07	-	86,725.45	30.64	15,805.26	15,805.26
2009 General Obligation (Tax Supported)	1,128,583.71	-	625,415.20	349.27	503,517.78	503,517.78
2009 Tax Notes (Tax Supported)	567,492.58	-	-	255.65	567,748.23	567,748.23
2009 Tax Notes (Water & Sewer)	344,560.46	-	172,500.00	146.76	172,207.22	172,207.22
2009 Tax Notes (Solid Waste)	405,459.54	-	-	182.65	405,642.19	405,642.19
2009 Tax Notes (Hotel Occupancy Tax)	196,676.40	-	10,875.59	86.45	185,887.26	185,887.26
Total TEXSTAR Investments	$ 3,940,622.10	$ -	$ 930,402.71	$ 1,579.91	$ 3,011,799.30	$ 3,011,799.30
Total Investments	$ 19,711,488.43	$ 10,278,268.35	$ 4,058,285.14	$ 10,342.17	$ 25,941,813.81	$ 25,941,813.81

This report is in compliance with the investment strategies as approved and the Public Funds Investment Act.

Andrea Gardner
City Manager

Stephanie Potvin
Project Accountant

Imelda Rodriguez
Director of Financial Services

Vacant
Assistant Director of Financial Services

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item H-1

Contact – Imelda Rodriguez, Director of Financial Services, 547-4221
irodriguez@ci.copperas-cove.tx.us

SUBJECT: **Public hearing and action on an ordinance amending the overall budget for the active Capital Improvement Project Bond Funds for the City of Copperas Cove.**

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1. BACKGROUND/HISTORY

According to Section 6.16(b)(1) of the Copperas Cove City Charter, in order for the City Council to amend the budget it must first hold a public hearing on the proposed amendments. The Charter also provides a requirement that when fund balance is to be used to fund increases in expenditures that two public hearings be held. The proposed budget amendment does not require the use of fund balance. The public hearing on August 17, 2010 is sufficient as required by the Charter.

Capital Improvement Program (CIP) Bond Funds include various bond and tax note issuances. The projects that are funded with these funds instead of operating funds are often times projects that require multiple years to complete with many factors taken into account. Once projects are identified, any required planning, architectural and engineering services are performed. After the design stage is complete, the project may have one or multiple construction contracts. Once the construction begins, some projects are in the construction phase for several months and others may last up to two years or longer. Due to the process, most of the CIP projects just roll funds from year to year until all of the projects are complete at which time the fund is closed out and any remaining funds go to pay back the debt service as required by law.

2. FINDINGS/CURRENT ACTIVITY

The Capital Improvement Project (CIP) Bond Fund budgets have been reviewed and available project funds are being re-appropriated to outstanding projects, projects that qualify under the bond covenant as a project that may be completed with the funding source, or used for debt service payments.

Following are available project funds that are being re-appropriated to outstanding projects:

2008 Limited Tax Notes (Tax Supported)

Camp Liveoak Renovation	($1,384)
Library Renovations	($9,090)
Active Software (Parks)	($10,300)
Summers Road/Street Reconstruction	($2,422)
Fire Station Relocation Land	$16,794
Playscape - City Park	$22,902
Recreation Center	($165,028)
Principal - 2008 Tax Notes for FY 2011	$130,000
Interest - 2008 Tax Notes for FY 2011	$35,028
Miscellaneous Revenue	$16,500

2008 Limited Tax Notes (Golf)

Interest Revenue	$2
Golf Cart Storage	$836
Interest - 2008 Tax Notes	($834)

2008A Limited Tax Notes (Tax Supported)

City Smart Lighting Upgrade	($1,339)
Bradford Drive Road Extension	$1,339

2008A Limited Tax Notes (Water & Sewer)

Water Tank Rehabs	($82,075)
Retrofit One Clarifier at South Plant	($475)
Facilities*	$82,550

* Funds are to repair the Weir Gate at the Northwest Wastewater Treatment Plant.

2009 Limited Tax Notes (Water & Sewer)

Vac-Con Truck	($6,674)
Long Mountain Tank Rehabilitation	$6,674

2009 Limited Tax Notes (Solid Waste)

Rearloader and Sideloader	($63,880)
Expansion of Recycle Center Phase II	$63,820
Bond Issuance Cost	$60

The following are available project funds that are being re-appropriated to another project fund:

2008 Limited Tax Notes (Tax Supported)

Transfer Out to 2008 LTN (Golf)	$298,999
Recreation Center	($298,999)

2008 Limited Tax Notes (Golf)

Transfer In from 2008 LTN (Tax Supt)	$298,999
Effluent Pond	$298,999

3. FINANCIAL IMPACT

See attached ordinance and proposed amendments.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends that the City Council hold a public hearing and approve Ordinance No. 2010-33, amending the overall budget for the active Capital Improvement Project Bond Funds.

ORDINANCE NO. 2010-33

AN ORDINANCE APPROVING AND ADOPTING AN AMENDMENT TO THE BUDGET FOR OPERATING THE MUNICIPAL GOVERNMENT OF THE CITY OF COPPERAS COVE FOR THE ACTIVE CAPITAL IMPROVEMENT PROJECT FUND BUDGETS; REPEALING ALL ORDINANCES AND APPROPRIATIONS IN CONFLICT WITH THE PROVISIONS OF THIS ORDINANCE; AND ESTABLISHING A SAVINGS CLAUSE AND AN EFFECTIVE DATE.

WHEREAS, the City Council desires to amend the operating budget of the municipal government of the City of Copperas Cove for the active Capital Improvement Project budgets; and

WHEREAS, said budget amendments have been submitted to the City Council by the City Manager in accordance with the City Charter; and

WHEREAS, public notices of public hearings upon this budget have been duly and legally made as required by City Charter and law.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF COPPERAS COVE:

SECTION I.

That the City Council of the City of Copperas Cove ratify, approve and adopt the amendments to the budget considered for the active Capital Improvement Project Fund budgets, as identified in “Attachment A” of this ordinance.

SECTION II.

That all ordinances for which provision has heretofore been made are hereby expressly repealed if in conflict with the provisions of this ordinance.

SECTION III.

That should any part, portion, or section of this ordinance be declared invalid or inoperative or void for any reason by a court of competent jurisdiction, such decision, opinion or judgment shall in no way affect the remaining portions, parts, or sections or parts of section of this ordinance, which provisions shall be, remain and continue to be in full force and effect.

SECTION IV.

That this ordinance shall take effect and be in full force and effect from and after its passage and publication according to law.

PASSED, APPROVED AND ADOPTED this 17th day of August 2010, at a regular called meeting of the City Council of the City of Copperas Cove, Texas, which meeting was held in compliance with the Open Meetings Act, *Tex. Gov't Code* 551.001, et.seq., at which meeting a quorum was present and voting.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

APPROVED AS TO FORM:

_____
Denton, Navarro, Rocha
& Bernal, P.C., City Attorney

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2008 Limited Tax Notes
Tax Supported

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
75-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
75-390-1001	Bond Proceeds	$ 1,485,000	$ 1,485,000	$ 1,485,000
75-370-6001	Interest Revenue	25,600	24,965	25,600
75-390-6005	Miscellaneous Revenue	83,000	99,500	99,500
Total Revenues		$ 1,593,600	$ 1,609,465	$ 1,610,100
Expenditures*				
75-4190-7500-6014	Arbitrage Rebate Services	$ 1,040	$ 1,040	$ 1,040
75-4190-7500-9500	Bond Issuance Costs	22,919	22,919	22,919
75-4190-7500-9032	Baseball Field Lighting	58,230	58,230	58,230
75-4190-7500-9033	Camp Liveoak Renovation	20,000	2,600	18,616
75-4190-7500-9034	Cash Receipts - City Wide	16,471	16,471	16,471
75-4190-7500-9035	Fire Station Relocation Land	125,000	141,794	141,794
75-4190-7500-9036	Playscape - City Park	33,113	59,175	56,016
75-4190-7500-9037	Playscape - Kate Street	35,030	35,030	35,030
75-4190-7500-9038	Recreation Center	500,000	35,973	35,973
75-4190-7500-9039	Park Renovations	31,781	31,781	31,781
75-4190-7500-9040	Library Renovations	50,000	40,910	40,910
75-4190-7500-9041	Soccer Field Lighting	71,670	71,670	71,670
75-4190-7500-9042	Active Software (Parks)	15,000	4,700	4,700
75-4190-7500-9043	Summers Road/Street Reconstructior	613,346	610,924	610,924
75-4190-7500-xxxx	Principal - 2008 Tax Note	-	-	130,000
75-4190-7500-xxxx	Interest - 2008 Tax Note	-	-	35,028
75-4190-7500-xxxx	Transfer Out to 2008 LTN(Golf)			298,999
Total Expenditures		$ 1,593,600	$ 1,133,216	$ 1,610,100
Ending Fund Balance				
75-300-0001		$ -	$ 476,249	$ (0)

* Prior year expenditures have been reconciled to the fund cash balance.

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2008 Limited Tax Notes
Golf

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
77-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
77-390-1001	Bond Proceeds	$ 80,000	$ 80,000	$ 80,000
77-370-6001	Interest Revenue	1,250	1,252	1,252
77-370-xxxx	Transfer In from 2008 LTN(Tax Supt)			298,999
Total Revenues		$ 81,250	$ 81,252	$ 380,251
Expenditures*				
77-4310-7400-9044	Golf Cart Storage	$ 69,443	$ 70,279	$ 70,279
77-4310-7500-xxxx	Effluent Storage Pond	-	-	298,999
77-4310-7400-9233	Principal - 2008 Tax Notes	10,000	10,000	10,000
77-4310-7400-9333	Interest - 2008 Tax Notes	1,807	973	973
Total Expenditures		$ 81,250	$ 81,252	$ 380,251
Ending Fund Balance				
77-300-0001		$ -	$ -	$ -

* Prior year expenditures have been reconciled to the fund cash balance.

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2008A Limited Tax Notes
Tax Supported

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
79-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
79-390-1001	Bond Proceeds	$ 1,060,000	$ 1,060,000	$ 1,060,000
79-370-6001	Interest Revenue	6,000	5,959	6,000
Total Revenues		$ 1,066,000	$ 1,065,959	$ 1,066,000
Expenditures*				
79-4190-7500-8200	Furniture	$ 15,839	$ 15,839	$ 15,839
79-4190-7500-8300	Vehicles	309,619	309,619	309,619
79-4190-7500-8400	General Equipment	37,346	37,346	37,346
79-4190-7500-8402	Electronic Equipment	225,508	224,452	225,508
79-4190-7500-8500	Facilities	9,500	9,500	9,500
79-4190-7500-9045	City Smart Lighting Upgrade	57,800	56,461	56,461
79-4190-7500-9046	Bradford Drive Road Extension	269,699	12,973	271,038
79-4190-7500-9047	Summers Road/Street Reconstructior	120,990	120,990	120,990
79-4190-7500-9500	Bond Issuance Costs	19,699	19,699	19,699
Total Expenditures		$ 1,066,000	$ 806,879	$ 1,066,000
Ending Fund Balance				
79-300-0001		$ -	$ 259,080	$ -

* Prior year expenditures have been reconciled to the fund cash balance.

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2008A Limited Tax Notes
Water & Sewer

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
80-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
80-390-1001	Bond Proceeds	$ 640,000	$ 640,000	$ 640,000
80-370-6001	Interest Revenue	3,600	3,646	3,600
Total Revenues		$ 643,600	$ 643,646	$ 643,600
Expenditures*				
80-4615-8500-8300	Vehicles	$ 79,261	$ 79,261	$ 79,261
80-4615-8500-8400	General Equipment	34,505	34,505	34,505
80-4615-8500-8500	Facilities	50,278	50,278	132,828
80-4615-8500-9049	Retrofit One Clarifier at South Plant	329,729	329,254	329,254
80-4615-8500-9050	Water Tank Rehabs	140,000	57,925	57,925
80-4615-8500-9500	Bond Issuance Costs	9,827	9,827	9,827
Total Expenditures		$ 643,600	$ 561,050	$ 643,600
Ending Fund Balance				
80-300-0001		$ -	$ 82,596	$ -

* Prior year expenditures have been reconciled to the fund cash balance.

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2009 Limited Tax Notes
Water & Sewer

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
67-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
67-390-1001	Bond Proceeds	$ 930,000	$ 930,000	$ 930,000
67-370-6001	Interest Revenue	3,000	766	3,000
Total Revenues		$ 933,000	$ 930,766	$ 933,000
Expenditures*				
67-4615-8500-8300	Vac-Con Truck	$ 251,000	$ 244,326	$ 244,326
67-4615-8500-9048	9th, 11th, 13th, 15th Street Water	24,500	-	24,500
67-4615-8500-9049	West Clarifier Retrofit	465,016	335,000	465,016
67-4615-8500-9050	Long Mountain Tank Rehab.	175,000	-	181,674
67-4615-8500-9500	Bond Issuance Costs	17,484	13,914	17,484
Total Expenditures		$ 933,000	$ 593,240	$ 933,000
Ending Fund Balance				
67-300-0001		$ -	$ 337,526	$ -

* Prior year expenditures have been reconciled to the fund cash balance.

Attachment A
Ordinance No. 2010-33

City of Copperas Cove, Texas
2009 Limited Tax Notes
Solid Waste

Account	Description	Total Project Budget	As of 5/31/2010	Total Amended Project Budget
Beginning Fund Balance				
68-300-0001	Fund Balance	$ -	$ -	$ -
Revenues				
68-390-1001	Bond Proceeds	$ 690,000	$ 690,000	$ 690,000
68-370-6001	Interest Revenue	2,000	724	2,000
Total Revenues		$ 692,000	$ 690,724	$ 692,000
Expenditures*				
68-4430-9500-8300	Rearloader and Sideloader	$ 339,218	$ 275,338	$ 275,338
68-4430-9500-9051	Expansion of Recycle Center Phase I	97,939	-	161,759
68-4430-9500-9052	Transfer Station Tipping/Renovations	244,580	-	244,580
68-4430-9500-9500	Bond Issuance Costs	10,263	10,323	10,323
Total Expenditures		$ 692,000	$ 285,661	$ 692,000
Ending Fund Balance				
68-300-0001		$ -	$ 405,063	$ -

* Prior year expenditures have been reconciled to the fund cash balance.

NOTICE OF PUBLIC HEARING

On August 17, 2010, during a Regular City Council Meeting, the City Council of the City of Copperas Cove will hold a public hearing on the ordinance to amend the Capital Improvement Project Fund budgets for the City of Copperas Cove. The August 17, 2010 City Council Meeting will begin at 7:00 pm and will be held in the City Council Chambers at City Hall, 507 South Main Street, Copperas Cove, Texas 76522.

The proposed amendments to the Capital Improvement Project Fund budgets are as follows:

	Increase (Decrease)
2008 Limited Tax Notes (Tax Supported)	
Recreation Center	($ 298,999)
Transfer Out to 2008 LTN (Golf)	$ 298,999
2008 Limited Tax Notes (Golf)	
Transfer In from 2008 LTN (Tax Supt)	$ 298,999
Effluent Pond	$ 298,999

Within the following Capital Improvement Project Fund budgets, project expenditure under-runs in some projects are being re-appropriated to fund anticipated project over-runs and authorized new projects.

2008 Limited Tax Notes (Tax Supported)	
Camp Liveoak Renovation	($1,384)
Library Renovations	($9,090)
Active Software (Parks)	($10,300)
Summers Road/Street Reconstruction	($2,422)
Fire Station Relocation Land	$16,794
Playscape - City Park	$22,902
Recreation Center	($165,028)
Principal - 2008 Tax Notes	$130,000
Interest - 2008 Tax Notes	$35,028
Miscellaneous Revenue	$16,500
2008 Limited Tax Notes (Golf)	
Interest Revenue	$2
Golf Cart Storage	$836
Interest - ’08 Tax Notes	($834)
2008A Limited Tax Notes (Tax Supported)	
City Smart Lighting Upgrade	($1,339)
Bradford Drive Road Extension	$1,339
2008A Limited Tax Notes (Water & Sewer)	
Water Tank Rehabs	($82,075)
Retrofit One Clarifier at South Plant	($475)
Facilities*	$82,550

* Funds are to repair the Weir Gate at the Northwest Wastewater Treatment Plant.

2009 Limited Tax Notes (Water & Sewer)	
Vac-Con Truck	($6,674)
Long Mountain Tank Rehabilitation	$6,674
2009 Limited Tax Notes (Solid Waste)	
Rearloader and Sideloader	($63,880)
Expansion of Recycle Center Phase II	$63,820
Bond Issuance Cost	$60

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. H-2

Contact – Wesley Wright, P.E., City Engineer, 547-0751
wwright@ci.copperas-cove.tx.us

SUBJECT: **Public hearing, consideration and action on adopting a land disturbance ordinance.**

---

1. BACKGROUND/HISTORY

On October 19, 2009, City Council established an ad-hoc committee to review a proposed Land Disturbance Ordinance and provide recommendations to Council. Active members of community on the committee consisted of Gilbert T. Hancock, Nelson Helm, Wes Atkinson, Samuel Banks. City staff committee members consisted of James Trevino, Assistant Public Works Director, Mike Morton, Chief Building Official, and Wesley Wright, P.E., City Engineer. Charlie Youngs was the City Council representative on the committee.

A workshop was conducted on May 18, 2010 in which the committee's recommendations were presented to the governing body of the City.

As required by the governing body, a public hearing was conducted on July 20, 2010 to provide the public an additional opportunity to discuss the proposed Land Disturbance Ordinance.

2. FINDINGS/CURRENT ACTIVITY

The purposes of the proposed Land Disturbance Ordinance are to inform the public about the hazards to life and property due to damages created by changes to existing landscape and to provide a means for which to establish and enforce protective measures to reduce damages. Any change to existing landscape, including cutting and filling of small spaces, may initiate or increase erosion and sedimentation and may also lead to changes in which storm water travels from one property to another.

The National Environmental Protection Agency (NEPA) and the Texas Commission on Environmental Quality (TCEQ) have mandated that local governments monitor and control pollutants entering drainage ways, streams, ponds, rivers, and lakes of the United States and Texas. The regulations require that municipalities act as the local enforcement agencies for all non point pollutants that may enter the aforementioned water ways including pollutants that

are borne in sediments that are carried away due to soil erosion and the sediments created in the water ways.

Additionally, the Federal Emergency Management Agency (FEMA) has released flood hazard maps for Bell County (adopted in 2008), and new flood hazard maps for Coryell County were adopted on February 17, 2010. Recent heavy rainfall events (the years 2007 and 2008) led to numerous properties being flooded and caused considerable injury to persons and property. The section of the subdivision ordinance dedicated to land disturbance will provide a method for staff review of proposed grading and the affects the proposed grading will have on area drainage.

The provisions within the proposed ordinance do not relieve any entity or property owner from storm water runoff related damages caused by the land disturbing activity, or the responsibility to adhere to all Federal and State requirements.

3. FINANCIAL IMPACT

No direct financial impact to the City will result from adopting the land disturbance ordinance.

4. ACTION OPTIONS/RECOMMENDATION

City staff and the ad-hoc Land Disturbance Ordinance Committee recommend City Council conduct a public hearing and add Section 17.5-60 to the Subdivision Ordinance by adopting Ordinance No. 2010-30 and set an effective date on August 18, 2010.

ORDINANCE NO. 2010-30

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS ADDING SECTION 17.5-60; REPEALING ALL ORDINANCES IN CONFLICT WITH THIS AMENDMENT; PROVIDING A SAVINGS CLAUSE; DECLARING AN EFFECTIVE DATE.

WHEREAS, it has been determined that the City of Copperas Cove desires a method to enforce protective measures and existing ordinances designed to reduce potential damages caused by unpermitted land disturbance.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS:

SECTION 1.

That the City's Code of Ordinances is hereby amended by amending Sec. 17.5-60 as follows:

Sec. 17.5- 60 Land Disturbance Permit

(a) *When required*. A land disturbance permit shall be obtained before any land disturbance activity, including grubbing, grading, or excavating, that causes to be moved more than three (3) cubic yards of soil, fill, or other material. A permit shall be obtained whenever the land disturbance activity is within the corporate limits of the City of Copperas Cove.

(b) *When not required*. A land disturbance permit is not required for the following land disturbing activities:

(1) The removal of woody or herbaceous plants on existing, individual one and two family residential parcels less than two (2) acres in size. All other properties shall be subject to permitting. In instances where, in the opinion of the City Engineer or designee, the removal of woody or herbaceous plants would not result in significant drainage or erosion control issues, permit may be waived.

(2) Tree removal that does not disturb the root system or soil.

(3) Agricultural activities such as clearing and cultivating ground for crops, construction of fences to contain livestock, construction of stock ponds, and other similar agricultural activities.

(4) Clearing of narrow sightlines for the specific purpose of conducting measurements and surveys.

(5) Trenching required for structural foundations or utility improvements.

(6) Routine maintenance of existing landscaping.

(c) *Required components*. An applicant proposing land disturbance must submit an application for a Land Disturbance Permit, a copy of their Notice of Intent (NOI) (when

required by any agency), proof of a Storm Water Pollution Prevention Plan (SWPPP) (when required by any agency), along with the following items:

(1) Completed permit application signed by the property owner or, in the case of a corporation/partnership, a party empowered to sign such actions (supported with authorizing documentation);

(2) Nonrefundable permit application fee, as established by the City Council;

(3) Deed showing current ownership of the subject property;

(4) Existing topographic survey (including all existing facilities, both under and above ground);

(5) Proposed grading plan (including all existing and proposed facilities, both under and above ground);

(6) Erosion control plan detailing how silt, sediment, and pollutants will remain onsite and how soil will be stabilized once land disturbance is complete.

(7)Homeowners of one and two family residential lots less than two (2) acres shall be required to provide *required components (1), (2), and (3).* Hand sketches combined with written descriptions of proposed modifications shall suffice for *required components (4), (5), and (6)* for permitting purposes of one and two family residential lots less than two (2) acres.

(d) *Review process.* The city staff agency responsible for the intake of the permit shall be the Building Department and the review of land disturbance permit applications shall be made by the City Engineer. Applications shall be submitted on a form provided by the Building Department. The City Engineer shall advise the applicant in writing of any concerns with the permit application. The City Engineer shall approve the issuance of the land disturbance permit if all components required by this section have been submitted, the fee paid, and all concerns have been addressed.

The City Engineer shall review the permit application for the following items:

(1) Completeness of the application;

(2) Compliance with all ordinances pertaining to drainage and detention;

(3) Compliance with all ordinances pertaining to erosion control.

(f) *Issuance of permit.* The Building Official shall issue a permit within ten (10) working days after the permit application is received or give a detailed written notice to the applicant that the permit application is unapproved. If response is not given within ten (10) days, applicant may request to have the permit taken to the City Manager's office for consideration.

If the permit application is returned as being unapproved, the applicant may correct the deficiencies and resubmit the permit application for approval without paying any additional fees. If the permit application is returned a second time or if a second request is not received within forty-five (45) calendar days of the date of notice of the first written notice, the applicant shall be required to resubmit the permit application and shall be required to pay all standard permit application fees.

(g) *Appeal.*

(1) Any appeals of the interpretation of this ordinance may be made to the supervisor of the City Engineer. An Appeal to the supervisor of the City Engineer

shall be requested in writing to the City Engineer requesting the appeal of the interpretation of the ordinance within in five (5) business days of the ruling by the City Engineer. If no appeal is filed within five (5) business days of the ruling by the City Engineer, the appellant is considered to have waved their rights of appeal. For the purposes of this ordinance, a written appeal may be made in writing by letter or email addressed to the City Engineer.

(2) The supervisor of the City Engineer will hear all issues and may call a meeting of the applicant for a sign permit or an existing sign permit holder. At this meeting, the supervisor of the City Engineer will attempt to resolve any conflicts through education on the intent of the codes. No code is written and adopted that can possibly predict all circumstances that may arise. The City Engineer and his/her supervisor will seek to identify alternatives to the issues that do not violate the intent of the code but allow individual circumstances to apply using a common sense approach. The supervisor of the City Engineer may elect to have more than one meeting to accomplish a resolution. He/she may also use other resources at his/her discretion to research possible alternatives. These resources may include but are not limited to; other cities with similar ordinances and codes, legal advice from the City Attorney, inquiries to other officials, and consultation with other staff members of the City of Copperas Cove.

(3) It is generally understood that the appeal meeting(s) will begin within ten (10) business days of the receipt of the appeal.

(4) A final appeal may be made to the City Council if no resolution can be reached through the process describes above. An Appeal to the City Council shall be requested in writing to the supervisor of the City Engineer requesting the appeal of the interpretation of the ordinance within in five (5) business days of the ruling by the supervisor of the City Engineer. This final appeal may not supersede the process above and the supervisor of the City Engineer will verify that the appeal process has been exhausted prior to hearing the final appeal. The decision of the City Council is final, and no further appeals may be made.

(5) This appeal process in no way represents a variance to the ordinance. It shall not be interpreted to be a circumvention of the intent of the ordinance. It is intended to seek all possible resolutions to interpretation issues while still complying with the intent of the ordinance.

SECTION 2.

That all ordinances for which provision has heretofore been made are hereby expressly repealed if in conflict with the provisions of this ordinance.

SECTION 3.

That should any section, clause, or provision of this ordinance be declared by a court of competent jurisdiction to be invalid, the same shall not affect the validity of this ordinance or any other ordinance of the City as a whole or any part thereof, other ordinance of the City as a whole or any part thereof, other than the part so declared to be invalid.

SECTION 4.

That this ordinance shall go into effect upon passage of the ordinance.

PASSED, APPROVED AND ADOPTED this 17th day of August 2010, at a regular meeting of the City Council of the City of Copperas Cove, Texas, which meeting was held in compliance with the Open Meetings Act, *Tex. Gov't. Code* §551.001, et.seq., at which meeting a quorum was present and voting.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

APPROVED AS TO FORM:

_____
Denton, Navarro, Rocha
& Bernal, P.C., City Attorney

ARTICLE III. GENERAL REGULATIONS

Sec. 17.5- 60 Land Disturbance Permit

(a) *When required*. A land disturbance permit shall be obtained before any land disturbance activity, including grubbing, grading, or excavating, that causes to be moved more than three (3) cubic yards of soil, fill, or other material. A permit shall be obtained whenever the land disturbance activity is within the corporate limits of the City of Copperas Cove.

(b) *When not required*. A land disturbance permit is not required for the following land disturbing activities:

(1) The removal of woody or herbaceous plants on existing, individual one and two family residential parcels less than two (2) acres in size. All other properties shall be subject to permitting. In instances where, in the opinion of the City Engineer or designee, the removal of woody or herbaceous plants would not result in significant drainage or erosion control issues, permit may be waived.

(2) Tree removal that does not disturb the root system or soil.

(3) Agricultural activities such as clearing and cultivating ground for crops, construction of fences to contain livestock, construction of stock ponds, and other similar agricultural activities.

(4) Clearing of narrow sightlines for the specific purpose of conducting measurements and surveys.

(5) Trenching required for structural foundations or utility improvements.

(6) Routine maintenance of existing landscaping.

(c) *Required components*. An applicant proposing land disturbance must submit an application for a Land Disturbance Permit, a copy of their Notice of Intent (NOI) (when required by any agency), proof of a Storm Water Pollution Prevention Plan (SWPPP) (when required by any agency), along with the following items:

(1) Completed permit application signed by the property owner or, in the case of a corporation/partnership, a party empowered to sign such actions (supported with authorizing documentation);

(2) Nonrefundable permit application fee, as established by the City Council;

(3) Deed showing current ownership of the subject property;

(4) Existing topographic survey (including all existing facilities, both under and above ground);

(5) Proposed grading plan (including all existing and proposed facilities, both under and above ground);

(6) Erosion control plan detailing how silt, sediment, and pollutants will remain onsite and how soil will be stabilized once land disturbance is complete.

(7)Homeowners of one and two family residential lots less than two (2) acres shall be required to provide *required components (1), (2), and (3).* Hand sketches combined with written descriptions of proposed modifications shall suffice for *required components (4), (5), and (6)* for permitting purposes of one and two family residential lots less than two (2) acres.

(d) *Review process.* The city staff agency responsible for the intake of the permit shall be the Building Department and the review of land disturbance permit applications shall be made by the City Engineer. Applications shall be submitted on a form provided by the Building Department. The City Engineer shall advise the applicant in writing of any concerns with the permit application. The City Engineer shall approve the issuance of the land disturbance permit if all components required by this section have been submitted, the fee paid, and all concerns have been addressed.

The City Engineer shall review the permit application for the following items:

(1) Completeness of the application;
(2) Compliance with all ordinances pertaining to drainage and detention;
(3) Compliance with all ordinances pertaining to erosion control.

(f) *Issuance of permit.* The Building Official shall issue a permit within ten (10) working days after the permit application is received or give a detailed written notice to the applicant that the permit application is unapproved. If response is not given within ten (10) days, applicant may request to have the permit taken to the City Manager's office for consideration.

If the permit application is returned as being unapproved, the applicant may correct the deficiencies and resubmit the permit application for approval without paying any additional fees. If the permit application is returned a second time or if a second request is not received within forty-five (45) calendar days of the date of notice of the first written notice, the applicant shall be required to resubmit the permit application and shall be required to pay all standard permit application fees.

(g) *Appeal.*

(1) Any appeals of the interpretation of this ordinance may be made to the supervisor of the City Engineer. An Appeal to the supervisor of the City Engineer shall be requested in writing to the City Engineer requesting the appeal of the interpretation of the ordinance within in five (5) business days of the ruling by the City Engineer. If no appeal is filed within five (5) business days of the ruling by the City Engineer, the appellant is considered to have waved their rights of appeal. For the purposes of this ordinance, a written appeal may be made in writing by letter or email addressed to the City Engineer.

(2) The supervisor of the City Engineer will hear all issues and may call a meeting of the applicant for a sign permit or an existing sign permit holder. At this meeting, the supervisor of the City Engineer will attempt to resolve any conflicts through education on the intent of the codes. No code is written and adopted that can possibly predict all circumstances that may arise. The City Engineer and his/her supervisor will seek to identify alternatives to the issues that do not violate the intent of the code but allow individual circumstances to apply using a common sense approach. The supervisor of the City Engineer may elect to have more than one meeting to accomplish a resolution. He/she may also use other resources at his/her discretion to research possible alternatives. These resources may include but are not limited to; other cities with similar ordinances and codes, legal advice from the City Attorney, inquiries to other officials, and consultation with other staff members of the City of Copperas Cove.

(3) It is generally understood that the appeal meeting(s) will begin within ten (10) business days of the receipt of the appeal.

(4) A final appeal may be made to the City Council if no resolution can be reached through the process describes above. An Appeal to the City Council shall be requested in writing to the supervisor of the City Engineer requesting the appeal of the interpretation of the ordinance within in five (5) business days of the ruling by the supervisor of the City Engineer. This final appeal may not supersede the process above and the supervisor of the City Engineer will verify that the appeal process has been exhausted prior to hearing the final appeal. The decision of the City Council is final, and no further appeals may be made.

(5) This appeal process in no way represents a variance to the ordinance. It shall not be interpreted to be a circumvention of the intent of the ordinance. It is intended to seek all possible resolutions to interpretation issues while still complying with the intent of the ordinance.

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. H-3
Contact – Wesley Wright, P.E., City Engineer, 547-0751
wwright@ci.copperas-cove.tx.us

SUBJECT: **Public hearing, consideration and action on adopting an ordinance establishing a Drainage Criteria Manual.**

---

1. BACKGROUND/HISTORY

On September 20, 2005, City Council authorized a contract with Walker, Wiederhold, and Associates to develop a Drainage Criteria Manual for the City of Copperas Cove.

On February 19, 2008, a workshop was held to introduce the first draft of the Drainage Criteria Manual.

On June 16, 2009, a second workshop was held to discuss the draft document in more detail.

On October 19, 2009, City Council established an ad-hoc committee to review a proposed Drainage Criteria Manual and provide recommendations to Council. Active members of community on the committee consisted of Gilbert T. Hancock, Nelson Helm, Wes Atkinson, Samuel Banks. City staff committee members consisted of James Trevino, Assistant Public Works Director, Mike Morton, Chief Building Official, Otto Wiederhold, P.E., Walker Partners, and Wesley Wright, P.E., City Engineer. Charlie Youngs was the City Council representative on the committee.

A workshop was conducted on July 6, 2010 in which the committee's recommendations were discussed in detail and a final draft document was presented to Council.

A public hearing was conducted on July 20, 2010 to provide the public an opportunity to discuss the proposed Drainage Criteria Manual.

2. FINDINGS/CURRENT ACTIVITY

An exhaustive and comprehensive review of the proposed Drainage Criteria Manual has been conducted and the final document is provided to Council for consideration.

3. FINANCIAL IMPACT

No direct financial impact to the City will result from adopting the Drainage Criteria Manual.

4. ACTION OPTIONS/RECOMMENDATION

City staff, Walker Partners, and the ad-hoc Drainage Criteria Manual Committee recommend City Council conduct a public hearing and amend Section 17.5-93(b) of the Subdivision Ordinance to adopt Ordinance No. 2010-31 establishing a Drainage Criteria Manual and set an effective date of August 18, 2010.

ORDINANCE NO. 2010-31

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS AMENDING SECTION 17.5-93(B); REPEALING ALL ORDINANCES IN CONFLICT WITH THIS AMENDMENT; PROVIDING A SAVINGS CLAUSE; DECLARING AN EFFECTIVE DATE.

WHEREAS, it has been determined that the City of Copperas Cove desires to adopt comprehensive drainage design criteria in the form of a Drainage Criteria Manual.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF COPPERAS COVE, TEXAS:

SECTION 1.

That the City's Code of Ordinances is hereby amended by amending Sec. 17.5-93(b) in its entirety to read as follows:

Sec. 17.5-93 Drainage Criteria

b. The most current Drainage Criteria Manual as approved by the City Council of the City of Copperas Cove is hereby adopted and included in its entirety as part of the Subdivision Ordinance. Any references to "Drainage Master Plan" or "DMP" shall be considered as referring to the Drainage Criteria Manual.

SECTION 2.

That all ordinances for which provision has heretofore been made are hereby expressly repealed if in conflict with the provisions of this ordinance.

SECTION 3.

That should any section, clause, or provision of this ordinance be declared by a court of competent jurisdiction to be invalid, the same shall not affect the validity of this ordinance or any other ordinance of the City as a whole or any part thereof, other ordinance of the City as a whole or any part thereof, other than the part so declared to be invalid.

SECTION 4.

That this ordinance shall go into effect on August 18, 2010.

PASSED, APPROVED AND ADOPTED this 17th day of August 2010, at a regular meeting of the City Council of the City of Copperas Cove, Texas, which meeting was held in compliance with the Open Meetings Act, *Tex. Gov't. Code* §551.001, et.seq., at which meeting a quorum was present and voting.

_____
John Hull, Mayor

ATTEST:

_____
Jane Lees, City Secretary

APPROVED AS TO FORM:

_____
Denton, Navarro, Rocha
& Bernal, P.C., City Attorney

DRAINAGE CRITERIA MANUAL

CITY OF COPPERAS COVE
DRAINAGE CRITERIA MANUAL

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SECTION 1 – DRAINAGE POLICY

1.1.0 GENERAL

This Manual represents the application of accepted principles of storm water drainage engineering and is a working supplement to basic information obtainable from standard drainage handbooks and other publications on drainage design. The policy statements of this section provide the underlying principles by which all drainage facilities shall be designed. The application of the policy is facilitated by the technical criteria contained in the remainder of the manual.

1.2.0 CITY OF COPPERAS COVE DRAINAGE POLICY

1.2.1 Application

The City's drainage policy shall govern the planning and design of drainage infrastructure within the Corporate Limits of the City and within all areas subject to its extra territorial jurisdiction, as required. Definitions, formulae, criteria, procedures and data in this manual have been developed to support this policy. If any condition requiring some additional measure of protection is identified during design or construction, the design engineer shall make provisions within the design. All plans must be signed and sealed by a Professional Engineer registered in the State of Texas.

1.2.2 General

A. Storm water runoff peak flow rates for the 25-yr and 100-yr frequency storms shall not cause increased adverse inundation of any building or roadway surface.

B. Street curbs, gutters, inlets and storm sewers shall be designed to intercept, contain and transport all runoff from the 25-yr frequency storm, without overtopping the curb.

C. In addition to B above, the public drainage system shall be designed to convey those flows from greater than the 25-yr frequency storm up to and including the 100-yr frequency storm within defined public rights-of-way or drainage easements.

D. When storm water detention is provided, storm water runoff peak flow rates shall not be increased at any point of discharge for the 25-yr storm and 100-yr storm frequency events.

1.2.3 Drainage Flow in Streets

No concentrated point discharges directly into streets will be allowed unless approved by the City Engineer.

No lowering of the standard height of street crown shall be allowed for the purposes of obtaining additional hydraulic capacity.

1.2.4 Street Cross Flow

Whenever storm runoff, other than limited sheet flow, moves across a traffic lane, a serious and dangerous impediment to traffic flow occurs. Cross-flow is allowed only in case of super elevation of a curve or overflow from the higher gutter on a street with cross fall. When runoff is allowed to cross from one curb line to the opposing curb line, the depth of flow shall not exceed six (6) inches of depth at any point within the street.

This policy prohibits the use of concrete valley gutters at points other than intersections. At points of concentration other than intersections, cross-flows shall be contained within underground storm conduit. The crown of the street shall not be removed to allow cross-flow.

1.2.5 Allowable Flow of Water Through Intersections

As the storm water flow approaches a street intersection, inlets shall be required if the depth of flow exceeds six (6) inches at any portion of the street intersection. Concrete valley gutters shall be used to convey storm water flow through intersections. In the case of T intersections designed as sump conditions, the Engineer shall demonstrate that the depth of storm water will not exceed six (6) inches at any point within the intersection. Inlets in such cases shall not be installed within the curb radius of the intersection.

1.2.6 Drainage System

A. Construction plans for proposed reinforced concrete box culverts, bridges and related structures may be adaptations of the current Texas Department of Transportation (TxDOT) Standards.

B. For bridges and culverts in residential streets, runoff from the 100-yr frequency flow shall not produce a headwater elevation at the roadway greater than either six (6) inches above the roadway crown elevation or any top of upstream curb elevation, whichever is lower.

C. For bridges and culverts in streets other than a residential street, runoff from the 100-yr frequency storm shall not produce a headwater elevation at the roadway greater than three (3) inches above the roadway crown elevation or three (3) inches above any top of upstream curb elevation, whichever is lower.

D. All drainage facilities (including but not limited to headwalls, open channels, storm sewers, area inlets, and detention, retention and water quality controls and their appurtenances) shall comply with the following requirements, unless otherwise noted in this section.

1. Storm sewer inlets and gutter transitions shall be designed to avoid future driveways and to avoid conflicts with standard water and wastewater service locations. No utilities shall be allowed to cross through a storm sewer inlet or culvert. No utilities shall be allowed to cross under a storm sewer inlet.
2. Drainage channels and detention ponds that are to be maintained by the public (City) shall be contained within drainage easements. Adequate room for access shall be provided for drainage channels and detention ponds. Ramps no steeper than five (5) feet horizontal to one (1) feet vertical shall be provided to allow access to drainage channels and detention ponds. The minimum bottom width for any channel with vegetative side slopes shall be four (4) feet.
3. Detention ponds shall be designed with adequate area around the perimeter for access and maintenance. The said area shall be a minimum of seven (7) feet wide for ponds with depths of five (5) feet or less (back slopes included) and a minimum of fifteen (15) feet wide for ponds over five (5) feet deep or with back slopes in excess of five (5) feet high. The said area shall not slope more than five (5) percent.

4. Rip-rap for slope protection or velocity dissipation shall be formed concrete dissipaters. Mortared rock or stone shall be allowed with a minimum of 12 inch diameter rock or stone.
5. Storm drains between lots (crossing blocks) shall be avoided as much as possible. When unavoidable, such drains shall be underground storm drains, located entirely on one (1) lot, laid along an alignment that retains the conduit within the dedicated drainage easement. Storm drains along rear of residential lots (through back yards) shall not be permitted. Easements shall be a minimum of fifteen (15) feet in width or 1.5 times the depth of the storm drain, whichever is greater. Fences may cross easements with underground facilities, but may not run parallel. Fences may not cross or run parallel within drainage easements designed for surface flow.
6. All bends, wyes and pipe size changes in storm sewers shall be prefabricated or shall occur at manholes/junction boxes. All alignment changes of 45 degrees or more shall occur at a manhole or junction box.
7. Bedding of storm sewer shall be to six (6) inches above the top of pipe or to current Public Works Standards (whichever is greater).
8. Storm drains shall be reinforced concrete pipe (RCP), ASTM C76, minimum Class III, and minimum eighteen (18) inch diameter. The Engineer shall provide load analysis to the Engineering Department as appropriate to demonstrate that class of pipe used is sufficient for the loading conditions. Higher strength pipes shall be used where loadings warrant such. Storm drains shall have a minimum of two (2) feet of cover in unpaved areas and a minimum of one and five tenths (1.5) feet of cover from bottom of the sub-grade in paved areas.
9. The use of High Density Polyethylene (HDPE) shall be allowed only if approved by the City Engineer. Its use shall be limited to unpaved areas outside of City streets. All cross street storm drainage conduit shall be reinforced concrete pipe (RCP). All outfall structures shall be constructed of reinforced concrete and the connection with the outfall structure shall be accomplished using RCP. A transition fitting from HDPE to RCP shall be made upstream of the outfall structure.
10. Junction boxes and manholes shall be reinforced concrete. Junction boxes in lieu of manholes shall be provided where any pipe opening exceeds thirty-seven (37) inches in diameter and where the distance from the outside surfaces of any two (2) pipes entering a manhole is less than one (1) foot, measured along the inside of the manhole.
11. Prefabricated wyes, mitered angle fittings and pipe size reducers shall be allowed in lieu of junction boxes and manholes for all changes in alignment less than 45 degrees. 45 degree alignment changes require a manhole or junction box.
12. Channels
    a. Concrete Channels
       Concrete channels shall be of sufficient cross section and slope (minimum 0.5%) as to fully contain design flows and facilitate self cleaning. Outfalls shall enter major collector drainage ways and major streams at grade or be designed and constructed with adequate concrete aprons, energy dissipaters or similar features to prevent erosion.
    b. Vegetated Channels
       Vegetated channels shall have sufficient grade (minimum 1.0%) but with velocities that will not be so great as to create erosion. Side slopes shall

not be steeper than three (3) feet horizontal to one (1) feet vertical for channels four (4) feet or less in depth and no steeper than four (4) feet horizontal to one (1) feet vertical in all other channels to allow for future growth and to promote slope stability. All slopes shall be hydro-mulched, sodded or seeded with approved grass, grass mixtures or ground cover suitable to the area and season in which they are applied. Seeded side slopes and bottoms shall be lined with erosion protection matting. All earthen channels must have vegetation eighty five percent (85%) established, with no bare spots greater than ten (10) square feet, prior to acceptance by the City of Copperas Cove. If vegetation cannot be adequately established prior to the desired acceptance date, up to three (3) months additional grow-in time may be granted by the City Engineer. Such an extension must be requested in writing with details of the efforts to be taken to ensure adequate vegetation will be established within 3 months. Extension requests must also be accompanied by an irrevocable line of credit, surety, or maintenance bond equal to one hundred percent (100%) of the cost to fully sod the entire area to be vegetated. This guarantee shall be separate from any other required maintenance bonds.

c. Major streams shall not be modified without consent of applicable state and federal agencies and authorization from the City Engineer.

13. Discharge from storm sewer outfalls shall not cause channel, bluff, or stream bank erosion. If the storm drain discharges to an open drainage facility (as determined by the City), the applicant must show acceptable non-erosive conveyance to that drainage facility, appropriate energy dissipation at the outfall and a stable headwall. No outfalls shall be allowed to discharge on the slope of the receiving channel.
14. If the development is located such that there is considerable drainage from potentially developable upstream areas, the developer may request participation by the City for the cost of over sizing of elements of the overall drainage system. The City shall consider these requests on a case by case basis. Final determination of any cost sharing will be determined by the City Council through a development agreement.

1.2.7 Computations

A. Computations to support all drainage designs shall be submitted to the appropriate City Departments for review. The computations shall be in such form as to allow for timely and consistent review and also to be made a part of the permanent city record for future reference. Computation shall include the impact of the proposed development to the downstream properties adjacent to the drainage resulting from the 100-yr event. All computations submitted shall be certified by a Professional Engineer licensed in the State of Texas. The Engineer shall provide the report to the City in both hard copy and a scanned electronic pdf file with the proper seal, signature and date.

B. Determination of Runoff

Numerous methods of rainfall-runoff computation are available on which the design of storm drainage and flood control systems may be based. The Rational Method shall be an acceptable means of computing runoff for drainage areas of 200 ACRES or less when designing streets, storm drainage systems, channels

and culverts. When the drainage area exceeds 200 ACRES in size, the National Resource Conservation Service (NRCS) (formerly the Soil Conservation Service) hydrologic methods (available in TR-20, TR-55 or HEC) should be used.

C. Detention Pond Storage Determination

A flow routing analysis using detailed hydrographs must be applied for all detention pond designs. The NRCS hydrologic methods (available in TR-20, TR-55, HEC-1, HEC RAS and the Hydrologic Engineering Center (HEC)) hydrologic methods may be used for areas of 200 ACRES or more. Use of the Modified Rational Method is limited to drainage areas less than 200 ACRES.

1.2.8 Stormwater Detention

Pre-developed peak flows generated from the 25-yr frequency storm shall not be increased. The peak flows from the 25-yr storm shall be detained in onsite stormwater detention basins with release rates equal to, or less than the flows generated from the site for the 25-yr storm event when the site was in its existing (natural) state. Detention ponds must also be designed such that the 100-yr storm will not overtop the structure. The design engineer shall design an emergency spillway system that will safely discharge the 100-yr storm without damage to the downstream property.

The City Engineer shall have the authority to waive the requirement for onsite detention, provided that at least one (1) of the following conditions is met:

1. The development is eligible to financially participate in an approved Regional Stormwater Management Program (Facility). Under this provision, the applicant shall demonstrate that the peak, post-developed runoff generated from the 100-yr storm can be conveyed downstream to the Regional Facility and not impact adversely any downstream properties. An adverse impact shall be:
    a. any impact which causes an inundation, or an increased inundation, of any building structure, roadway, or improvement.
    b. downstream erosion and/or sedimentation, or an increase in erosion and/or sedimentation.

2. The development is adjacent to a defined water course that has sufficient capacity to convey the site's post-developed peak discharge from the 100-yr storm event without creating an adverse impact on any other properties. The discharge in the water course shall be determined by using the 100-yr storm event with the post-developed site and the remainder of the watershed in an ultimate build-out state.

3. The development is located such that onsite detention may worsen downstream conditions of the watershed. In such cases, the design engineer shall demonstrate that conveyance or a combination of detention & conveyance will provide a safer downstream condition. Available capacity downstream shall not be considered as sufficient justification to waive detention.

1.2.9 Flood Plain Management

A. City of Copperas Cove

In all cases where floodplain delineation is required, its determination shall be based on the projected ultimate development of all properties contributing to the point of consideration. It is the responsibility of the design engineer to determine the ultimate developed drainage condition is based on the most accurate information available.

For the purposes of this policy, any concentrated flow within a watershed that has a drainage area of three hundred twenty (320) ACRES or greater, unless previously defined by FEMA, shall be delineated as a floodplain.

All existing floodplains created by the base flood as computed with current, existing conditions, shall be deemed the Floodway (regulatory floodway) and shall be wholly contained within dedicated rights-of-way or easements. Encroachments are prohibited, including fill, new construction, substantial improvements and other development unless certification by a Professional Engineer is provided, demonstrating that encroachments shall not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

All new construction and substantial improvements of buildings (structures) shall have the lowest floor (including basement) two (2) foot above the base flood, based upon the projected, ultimate development of all properties (without stormwater detention) contributing to the point of consideration.

All floodplains shall be computed utilizing the computer software and methodologies outlined in the Drainage Criteria Manual.

If land development activities are proposed which will result in flood hazard boundary delineations different from those depicted on the current Flood Insurance Rate Map (FIRM) issued by the Federal Emergency Management Agency (FEMA), the applicant for a development permit shall obtain a Conditional/Letter of Map Revision (CLOMR/LOMR) from FEMA.

All floodplain delineations for FIRM revisions shall be based upon field-surveyed cross-sections performed in accordance with the guidelines outlined in this Manual.

B. Federal Emergency Management Agency

1. The Federal Emergency Management Agency (FEMA) maintains Flood Insurance Rate Maps (FIRMs) that depict floodplain and floodway boundaries. The floodplain and floodway boundaries depicted on FIRMs are based on existing conditions of development in the contributing area.
2. FEMA reviews and approves or denies all revisions or amendments to FIRMs. FEMA revises or amends FIRMs by approval of a Letter of Map Amendment (LOMA) or Letter of Map Revision (LOMR). FEMA establishes

the process and fees necessary for review of an application for LOMA or LOMR.

3. FEMA reviews the impact of proposed site developments and offers or denies conditional assurance that a FIRM may be changed by the proposed development. FEMA offers this assurance by a Conditional Letter of Map Amendment (CLOMA) or Conditional Letter of Map Revision (CLOMR). The CLOMA or CLOMR is a conditional statement that the FIRM may be changed if:
    a. the development is constructed as proposed in the CLOMA/CLOMR application, and if
    b. a complete LOMA/LOMR is submitted after construction of the proposed development.

C. Coordination of City of Copperas Cove and FEMA Floodplain Delineations

1. If the floodplain depicted on the FIRM is required to be changed due to updated analysis of the floodplain under existing conditions, then the following requirements are applicable:
    a. Prior to recordation of a final plat with revised floodplain delineation included, the applicant must provide to the City evidence of a FEMA approved CLOMR/CLOMA or LOMR/LOMA.
    b. Prior to issuance of building permits on lots within the current FEMA FIRM floodplain, the applicant must provide to the City evidence of final acceptance by FEMA of the LOMR/LOMA submitted under (a) above.

2. If the floodplain depicted on the FIRM is required to be changed due to land development activities that alter existing conditions, then the following requirements are applicable:
    a. Prior to approval of final plat, the applicant must provide to the City evidence of receipt by FEMA of an application for a CLOMR.
    b. Prior to recordation of a final plat, the applicant must provide to the City evidence of approval of the CLOMR submitted under (a) above.
    c. If the final plat is approved before it is determined that a CLOMR is necessary or desired, then prior to release of subdivision construction plans, the applicant must provide to the City a letter of acknowledgement by FEMA of receipt of a complete application for a CLOMR.
    d. Prior to issuance of building permits on affected lots, the applicant must provide to the City evidence of final acceptance by FEMA of the CLOMR submitted under (c) above, and a letter of acknowledgement by FEMA of a complete application for a LOMR.

3. The applicant shall bear the cost of engineering services required to develop the application, respond to review comments, and obtain final approval of LOMRs and CLOMRs. The applicant shall bear the cost of any fees associated with review and disposition of LOMRs and CLOMRs that are established by FEMA.

1.2.10 Lot Grading

A. All site developments must provide a site grading and drainage plan that includes drainage computations, detention of runoff (if required) and a detailed site grading plan that does not adversely affect adjacent lots, property or downstream property.

B. Finished floor elevations shall be shown on all lots on the construction plans. Finished floor elevations shall be a minimum of one (1) feet above the average top of curb elevation fronting the lot (one and a half (1.5) feet above the average edge of pavement where no curb is present). The grading plan shall include arrows indicating the direction of runoff for each lot. Where practical, all lots shall be graded from rear to front at which point the drainage shall be intercepted by the street. If the minimum one foot requirement can not be met due to land slope, topography or existing trees, alternate grading plans may be utilized. In these instances it shall be demonstrated to the satisfaction of the City Engineer that grading from front to rear would be more reasonably adaptable to the existing topography. All lots that fall into this second category shall be identified on the Final Plat by a listing table.

C. Finished floor elevations shall be shown for all lots adjacent to or encroaching upon the FEMA designated 100-yr flood plain. Finished floor elevations shall be a minimum of two (2) feet above the base flood elevations.

D. Lot to lot drainage is prohibited except in residential developments where one (1) lot may drain onto one (1) adjacent lot to the rear. Residential lots may not drain from side to side unless directly adjacent to a city maintained facility (right-of-way or easement). The cumulative storm water runoff on any single residential lot may not exceed the cumulative storm water runoff generated from a total of two (2) residential lots.

E. The applicant for a building permit for a developed lot that is graded from front to rear shall prepare a detailed site grading plan that includes elevations for all corners of the subject lot, all corners of the downstream lot, the finished floor slab elevation, final contours, swales, and any modifications to side yard or rear yard fencing to facilitate removal of runoff from the subject lot. The site grading plan must be sealed, signed and dated by a professional engineer licensed in the State of Texas.

F. All earthen swales must have a minimum of one percent (1%) slope.

G. Easements must be a minimum of fifteen (15) feet wide or 1.5 times the depth of any buried pipe, whichever is greater. All easements must be located entirely on one (1) lot.

1.2.11 Erosion Control

Rock berms, silt fences, sedimentation basins, stabilized construction entrances/exits and similar recognized techniques shall be employed during and after construction to prevent point source sedimentation loading of downstream facilities. Erosion control protection must be provided along all disturbed areas adjacent to city maintained facilities. Such measures must be installed prior to city acceptance and must be maintained until a certificate of occupancy is issued on the property. Such installations shall comply with current TCEQ requirements. Additional measures may be required during and after construction if during subsequent runoff events erosion or sediment damage is documented as a violation of TCEQ regulations or City Ordinance by City Staff.

1.3 DEFINITIONS

All terms and abbreviations used in the text are presented in the Glossary of this Manual.

SECTION 2 - DETERMINATION OF STORM RUNOFF

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SECTION 2 - DETERMINATION OF STORM RUNOFF

2.1.0 GENERAL

If continuous records of the amounts of runoff from urban areas were as readily available as records of precipitation, they would provide the best source of data on which to base the design of storm drainage and flood protection systems. Unfortunately, such records are available in very few areas in sufficient quantity to permit an accurate prediction of the stormwater runoff. The accepted practice, therefore, is to relate runoff to rainfall, thereby providing a means for predicting the amount of runoff to be expected from urban watersheds at given recurrence intervals.

Numerous methods of rainfall runoff computations are available on which the design of storm drainage systems may be based. The method chosen is dependent upon the Engineer's technical familiarity and the size of the area to be analyzed. Within the method chosen the Engineer will be responsible for making assumptions as to the development characteristics of the study area.

2.2.0 EFFECTS OF URBANIZATION

It has long been recognized that urban development has a pronounced effect on the rate of runoff from a given rainfall. The hydraulic efficiency of a drainage area is generally improved by urbanization which in effect reduces the storage capacity of a watershed. This reduction of a watershed's storage capacity is a direct result of the elimination of porous surfaces, small ponds, and holding areas. This comes about by the grading and paving of building sites, streets, drives, parking lots, and sidewalks and by construction of buildings and other facilities characteristic of urban development. The result of the improved hydraulic efficiency is illustrated graphically in Figure 2-1 in Appendix B of this Manual, which is a plot of the runoff rate versus time for the same storm with two different stages of watershed development.

2.2.1 Design Assumptions For Stormflow Analysis

A. When analyzing an area for channel design purposes, urbanization of the full watershed without detention ponds shall be assumed (except as noted in paragraph E. below). Zoning maps, future land use maps, and master plans should be used as aids in establishing the anticipated surface character of the ultimate development. The selection of design runoff coefficients and/or percent impervious cover factors are explained in the following discussions of runoff calculation.

B. An exception to paragraph A. above may be granted if the channel is immediately downstream of a regional detention pond and written approval is obtained from the City Engineer.

C. In designing a storm sewer system within a residential subdivision, full development of adjoining and interior tracts without detention must be assumed.

D. In designing a storm sewer system within a commercial or multifamily subdivision, 25-year stormflows can, at the Engineer's discretion, reflect the flow reduction anticipated by future detention ponds. This applies exclusively to the flows generated by those properties contained within the subdivision. Provisions for conveyance of the 100-year undetained flows within the right-of-way or drainage easements still apply (See Section 1.2.2B.).

E. In the event the Engineer desires to incorporate the flow reduction benefits of existing upstream detention ponds, the following field investigations and hydrologic analysis will be required: (Please note that under no circumstances will the previously approved construction plans of the upstream ponds suffice as an adequate analysis. While the responsibility of the individual site or subdivision plans rests with the Engineer of record, any subsequent engineering analysis must assure that all the incorporated ponds work collectively.)

1. A field survey of the existing physical characteristics of both the outlet structure and ponding volume. Any departure from the original Engineer's design must be accounted for. If a dual use for the detention pond exists, (e.g., storage of equipment) then this too should be accounted for.
2. A comprehensive hydrologic analysis which simulates the attenuation of the contributing area ponds. This should not be limited to a linear additive analysis but rather a network of hydrographs which considers incremental timing of discharge and potential coincidence of outlet peaks.

2.3.0 METHOD OF ANALYSIS

Numerous methods of rainfall-runoff computation are available on which the design of storm drainage and flood control systems may be based. The Rational Method and the Variable Rainfall Intensity Method are accepted as adequate for drainage areas totaling 100 acres or less. For larger drainage systems, the Soil Conservation Service hydrologic methods (available in TR-20, HEC-1 or the Tabular/Graphical methods) should' be used. The method of analysis must remain consistent when drainage areas are combined and the method which applies to the largest combined drainage area should be used. Table 2-1 is to be used as a guide in determining some of the applicable methods for calculating storm runoff. The Engineer can use other methods but must have their acceptability approved by the City Engineer.

Table 2-1
Storm Runoff Calculation Methods

Contributing Area	Runoff Methods
Less than 200 Acres	Rational or VRIM[1] SCS Tabular/Graphical[2]
200 Acres-400 Acres	SCS Tabular/Graphical[5] TR-20, HEC-1 or HEC-HMS
Greater than 400 Acres	SCS TR-20, HEC-1 or HEC-HMS

1. VRIM, Variable Rainfall Intensity Method in Section 2.4.5
2. SCS, Tabular/Graphical and TR-20 Methods in Section 2.6.4
3. It is recommended that the hand calculated SCS Tabular Method not be used for areas greater than four hundred (400) acres due to the rigorous nature of the calculations and likelihood of error

2.4.0 RATIONAL METHOD

The Rational Method is based on the direct relationship between rainfall and runoff, and is expressed by the following equation:

$$Q_p = CiA \qquad \text{(Eq.2-1)}$$

Where:

- Q_p is defined as the peak runoff in cubic feet per second. Actually, Q_p is in units of inches per hour per acre. Since this rate of in/hr/ac differs from cubic feet per second by less than one (1) percent (1 in/hr/ac = 1.008 cfs), the more common units of cfs are used.
- C is the coefficient of runoff representing the ratio of peak runoff rate "Q_p" to average rainfall intensity rate "i" for a specified area "A".
- i is the average intensity of rainfall in inches per hour for a period of time equal to the time of concentration (t_c) for the drainage area to the point under consideration.
- A is the area in acres contributing runoff to the point of design.

The following basic assumptions are associated with the Rational Method:

A. The storm duration is equal to the time of concentration.

B. The computed peak rate of runoff to the design point is a function of the average rainfall rate during the time of concentration to that point.

C. The return period or frequency of the computed peak flow is the same as that for the design storm.

D. The necessary basin characteristics can be identified and the runoff coefficient does not vary during a storm.

E. Rainfall intensity is constant during the storm duration and spatially uniform for the area under analysis.

2.4.1 Runoff Coefficient (C)

The proportion of the total rainfall that will reach the drainage system depends on the imperviousness of the surface and the slope and ponding characteristics of the area. Impervious surfaces, such as asphalt pavements and roofs of buildings, will be subject to approximately one hundred (100) percent runoff (regardless of the slope). On-site inspections and aerial photographs may prove valuable in estimating the nature of the surfaces within the drainage area.

The runoff coefficient "C" in the Rational Formula is also dependent on the character of the soil. The type and condition of the soil determines its ability to absorb precipitation. The rate at which a soil absorbs precipitation generally decreases as the rainfall continues for an extended period of time. The soil infiltration rate is influenced by the presence of soil moisture (antecedent precipitation), the rainfall intensity, the proximity of the ground water table, the degree of soil compaction, the porosity of the subsoil, and ground slopes.

It should be noted that the runoff coefficient "C" is the variable of the Rational Method which is least susceptible to precise determination. A reasonable coefficient must be chosen to represent the integrated effects of infiltration, detention storage, evaporation, retention, flow routing and interception, all of which affect the time distribution and peak rate of runoff.

Table 2-2 presents recommended ranges for "C" values based on specific land use types.

2.4.2 Time of Concentration

The time of concentration is the time associated with the travel of runoff from an outer point which best represents the shape of the contributing areas. Runoff from a drainage area usually reaches a peak at the time when the entire area is contributing, in which case the time of concentration is the time for a drop of water to flow from the most remote point in the watershed to the point of interest. Runoff may reach a peak prior to the time the entire drainage area is contributing. Sound engineering judgment should be used to determine the time of concentration. The time of concentration to any point in a storm drainage system is a combination of the sheet flow (overland), the shallow concentrated flow and the channel flow, which includes storm sewers. The minimum time of concentration for any area shall be five (5) minutes.

A. **Sheet Flow.** Sheet flow is shallow flow over land surfaces which usually occurs in the headwaters of streams. The Engineer should realize that sheet flow occurs for only very short distances in urbanized conditions. Urbanized areas are assumed to have sheet flow of three hundred (300) feet or less. The following equation 2-2 has been developed for sheet flow of less than three hundred (300) feet.

$$t_c = Ln/(42s^{0.5}) \qquad \text{(Eq. 2-2)}$$

where,

t_c = Time of concentration in minutes
L = Length of the reach in ft.
n = Manning's n (see Table 2-3)
s = Slope of the ground in ft/ft

B. **Shallow Concentrated Flow.** After a maximum of three hundred (300) feet sheet flow becomes shallow concentrated flow. The time of concentration for shallow concentrated flows can be computed from equation 2-3 which is as follows:

$$t_c = Ln/(60s^{0.5}) \qquad \text{(Eq. 2-3)}$$

where,

t_c = Time of concentration in minutes
L = Length of the reach in ft.
n = Manning's n (see Table 2-3)
s = Slope of the ground in ft/ft

C. Channel or Storm Sewer Flow. The velocity in an open channel or a storm sewer not flowing full can be determined by using Manning's Equation. Channel velocities can also be determined by using backwater profiles. Usually, average flow velocity is determined assuming a bank-full condition. The details of using Manning's equation and selecting Manning's "n" values for channels can be obtained from Section 6 of this Manual.

For full flow storm sewer conditions (pressure flow) the following equation should be applied:

$$V = Q/A \quad . \qquad \text{(Eq. 2-4)}$$

Where:

V = Average velocity, ft/s
Q = Design discharge, cfs
A = Cross-sectional area, ft^2

TABLE 2-2
RATIONAL METHOD RUNOFF COEFFICIENTS FOR COMPOSITE ANALYSIS
Runoff Coefficient (C)

Character of Surface	Return Period						
	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	500 Years
DEVELOPED							
Asphaltic	0.73	0.77	0.81	0.86	0.90	0.95	1.00
Concrete	0.75	0.80	0.83	0.88	0.92	0.97	1.00
Grass Areas (Lawns, Parks, etc.)							
Poor Condition*							
Flat, 0-2%	0.32	0.34	0.37	0.40	0.44	0.47	0.58
Average, 2-7%	0.37	0.40	0.43	0.46	0.49	0.53	0.61
Steep, over 7%	0.40	0.43	0.45	0.49	0.52	0.55	0.62
Fair Condition**							
Flat, 0-2%	0.25	0.28	0.30	0.34	0.37	0.41	0.53
Average, 2-7%	0.33	0.36	0.38	0.42	0.45	0.49	0.58
Steep, over 7%	0.37	0.40	0.42	0.46	0.49	0.53	0.60
Good Condition***	0.21	0.23	0.25	0.29	0.32	0.36	0.49
Flat, 0-2%	0.29	0.32	0.35	0.39	0.42	0.46	0.56
Average, 2-7%	0.34	0.37	0.40	0.44	0.47	0.51	0.58
Steep, over 7%							
UNDEVELOPED							
Cultivated							
Flat, 0-2%	0.31	0.34	0.36	0.40	0.43	0.47	0.57
Average, 2-7%	0.35	0.38	0.41	0.44	0.48	0.51	0.60
Steep, over 7%	0.39	0.42	0.44	0.48	0.51	0.54	0.61

TABLE 2-2 (Continued)

RATIONAL METHOD RUNOFF COEFFICIENTS FOR COMPOSITE ANALYSIS
Runoff Coefficient (C)

Character of Surface	Return Period						
	2 Years	5 Years	10 Years	25 Years	50 Years	100 Year	500 Years
Pasture/Range							
Flat, 0-2%	0.25	0.28	0.30	0.34	0.37	0.41	0.53
Average, 2-7%	0.33	0.36	0.38	0.42	0.45	0.49	0.58
Steep, over 7%	0.37	0.40	0.42	0.46	0.49	0.53	0.60
Forest/Woodlands							
Flat, 0-7%	0.22	0.25	0.28	0.31	0.35	0.39	0.48
Average, 2-7%	0.31	0.34	0.36	0.40	0.43	0.47	0.56
Steep, over 7%	0.35	0.39	0.41	0.45	0.48	0.52	0.58

* Grass cover less than 50 percent of the area.
** Grass cover on 50 to 75 percent of the area.
*** Grass cover larger than 75 percent of the area.

Source: 1. Rossmiller, R.L. "The Rational Formula Revisited."
2. City of Austin, Watershed Engineering Division

TABLE 2-3 MANNING'S "n" FOR OVERLAND FLOW AND SHALLOW CONCENTRATED FLOW	
Manning's "n"	Condition
0.016	Concrete (rough or smoothed finish)
0.02	Asphalt
0.1	0-50% vegetated ground cover, remaining bare soil or rock outcrops, minimum brush or tree cover
0.2	50-90% vegetated ground cover, remaining bare soil or rock outcrops, minimum- medium brush or tree cover
0.3	100% vegetated ground cover, medium- dense grasses (lawns, grassy fields etc.) medium brush or tree cover
0.6	100% vegetated ground cover with areas of heavy vegetation (parks, green- belts, riparian areas etc.) dense under- growth
Source: City of Austin, Watershed Engineering Division	

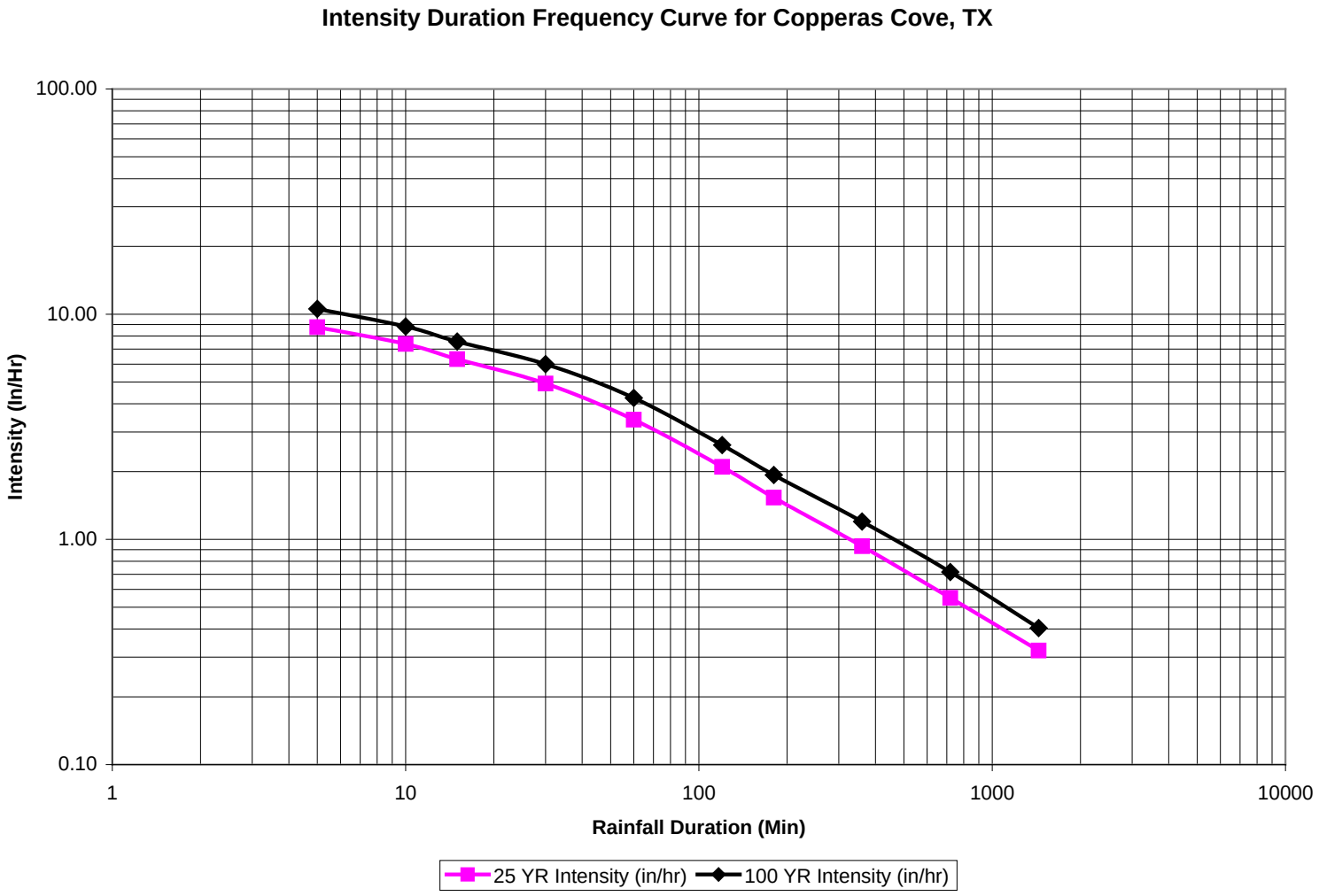
2.4.3 Rainfall Intensity (i)

Rainfall intensity (i) is the average rainfall rate in inches per hour, and is selected on the basis of design rainfall duration and design frequency of occurrence. The design duration is equal to the time of concentration for the drainage area under consideration. The design frequency of occurrence is a statistical variable which is established by design standards or chosen by the Engineer as a design parameter.

The selection of the frequency criteria is necessary before applying any hydrologic method. Storm drainage improvements in Copperas Cove must be designed to intercept and carry the runoff from a twenty-five (25) year frequency storm, with an auxiliary or overflow system capable of carrying a one hundred (100) year frequency storm.

The rainfall intensity used in the rational method is read from the intensity-duration-frequency curves based on the selected design frequency and design duration.

The Copperas Cove intensity-duration-frequency curves are shown in Figure 2-2 in Appendix B of this Manual.



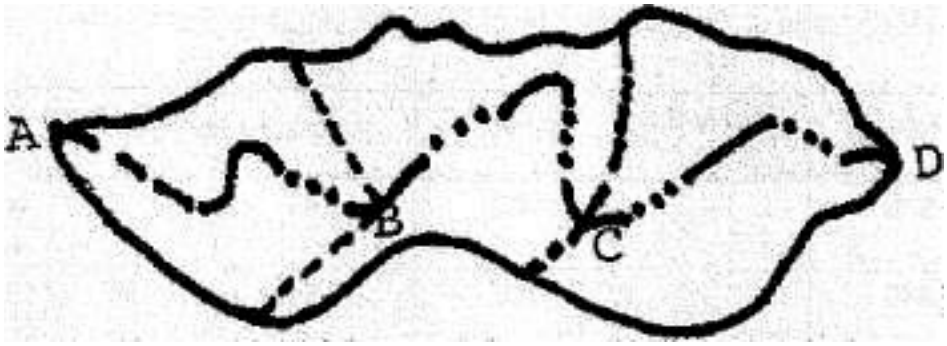
The intensity-duration-frequency curves and the intensity-duration equations are applicable for all design frequencies shown and for storm durations from five (5) minutes to 3 hours. They are required for use in determining peak flows by the Rational Method or other appropriate methods.

2.4.4 Drainage Area (A)

The size (acres) of the watershed needs to be determined for application of the Rational Method. The area may be determined through the use of maps, supplemented by field surveys where topographic data has changed or where the contour interval is too great to distinguish the direction of flow. The drainage divide lines are determined by street layout, lot grading, structure configuration and orientation, and many other features that are created by the urbanization process. .

Example 2-1

An urbanized watershed is shown on the following figure. Three types of flow conditions exist between the most distant point in the watershed and the outlet. The calculation of time of concentration and travel time in each reach is as follows:



Reach	Description of Flow	Slope (%)	Length (Ft.)	Drainage Area (Acre)	"n" Value
A to B	Sheet flow (grass lawn)	4.5	300	3	0.3
B to C	Shallow concentrated flow (gutter)	2.0	840	20	0.016
C to D	Storm drain with inlets n=0.015D=3	1.5	1,200	30	

For reaches A-B and B-C, the time of concentration can be calculated from Equations 2-2 and 2-3.

t_c (A-B) $= 300(0.3)/42(s)^{0.5}$

$= 2.14/(0.045)^{0.5}$

$= 10.1$ min.

t_c(B-C) $= 840(0.016)/60(s)^{0.5}$

$= 0.22/(0.02)^{0.5}$

$= 1.6$ min.

The flow velocity in reach C-D needs to be calculated from Manning's Equation, using the assumption of full pipe flow, as follows:

$V_{C\text{-}D} = (1.49/n)\ R^{0.67}s^{0.5}$

$= (1.49/n)(D/4)^{0.67}s^{0.5}$

$= (1.49/0.015)\ (3/4)^{0.67}(0.015)^{0.5}$

$= 10.0$ft/s

The runoff coefficients (C) for the three (3) areas are given as follows for the 100 year storm. The time of concentration (t_c) is calculated by dividing the length by the velocity.

Reach	Length (ft.)	Velocity (fps)	t_c (min)	C	Area (acre)
A-B	300	—	10.1	0.41	3
B-C	840	—	1.6	0.85	20
C-D	1200	10.0	2.0	0.81	30
			13.7		53

The intensity (i) of the 100 year storm (from Figure 2-2 in Appendix B of this Manual) for 13.7 minutes = 9.2 inches per hour.

The composite runoff coefficient (C) = (0.41 X 3 + 0.85 X 20 + 0.81 X 30)/53= 0.80

Thus the peak flow Qp = CiA = 0.80 X 9.2 in/hr X 53 acre = 390 cfs

2.4.5 Variable Rainfall Intensity Method

The Variable Rainfall Intensity Method is one of the methodologies which uses the peak flow (Qp) calculated from the Rational Method to develop the hypothetical storm hydrographs. The detailed information on this method can be found in the Bibliograhpy, Item 2-5 of this Manual. The following example illustrates the application of the variable rainfall intensity method technique in constructing a ten (10) year design storm hydrograph.

Example 2-2

Variable Rainfall Intensity Method

Given: A drainage area, when fully developed, will have the following characteristics:

Drainage area = one hundred (100) acres
Runoff coefficient C = 0.45
Design rainfall frequency: ten (10) year
Copperas Cove rainfall intensity-duration-frequency curves (Figure 2-2 in Appendix B of this Manual)
Time of concentration = forty (40) minutes.

Find: The ten (10) year design storm and resulting flood hydrograph.

Solution: The solution is outlined in Table 2-6 which shows the development of the design ten (10) year frequency storm and Table 2-7 which shows the computation of the design ten (10) year flood hydrograph.

The computation procedures for Table 2-6 are explained as follows:

Column 1: Duration (minutes) = length of storm.

Column 2: Rainfall Intensity read from Figure 2-2 in Appendix B of this manual corresponding to the duration time in Column 1.

Column 3: Accumulated Depth (inches) = total precipitation for storm of specified duration (from Table 2-11).

Column 4: Incremental Depth (inches) = difference in total

precipitation between specified duration and duration of five (5) minutes less than specified duration (e.g., P35 minutes - P30 minutes).

Column 5: Incremental Intensity (inches/hour) = Incremental Depth (inches) x (60 minutes/hour)/(five (5) minutes).

Table 2-6
Development Of A Ten (10) Year Frequency Storm

Duration (Min) (1)	Intensity (In/hr) (2)	Accumulated Depth (In) (3)	Incremental Depth (In) (4)	Incremental Intensity (In/hr) (5)
5	8.64	.034	0.34	.41
10			0.36	.43
15	6.16	.108	.038	.46
20			.04	.48
25	5.00	.19	.04	.48
30			.05	.60
35	4.30	.29	.05	.60
40			.06	.72
45	3.73	.41	.06	.72
50			.07	.84
55	3.33	.56	.08	.96
60			.09	1.08
65	3.00	.76	.11	1.32
70			.13	1.56
75	2.74	1.07	.18	2.16

Table 2-6 (Continued) Development Of A Ten (10) Year Frequency Storm				
Duration (Min) (1)	**Intensity (In/hr) (2)**	**Accumulated Depth (In) (3)**	**Incremental Depth (In) (4)**	**Incremental Intensity (In/hr) (5)**
80			.24	2.88
85	2.50	1.67	.36	4.32
90			.72	8.64
95	2.32	2.89	.5	6.0
100			.29	3.48
105	2.17	3.38	.20	2.4
110			.15	1.8
115	2.05	3.65	.12	1.44
120			.1	1.2
125	1.94	3.83	.08	.96
130			.08	.96
135	1.85	3.98	.07	.84
140			.06	.72
145	1.77	4.09	.05	.60
150			.05	.60
155	1.69	4.19	.05	.60
160			.04	.48
165	1.62	4.27	.04	.48
170			.04	.48
175	1.56	4.34	.03	.36
180			.03	.36
185	1.50	4.38		.36

Table 2-7 illustrates the computed 10 year flood hydrograph for the drainage area described in Table 2-6. Referring to Table 2-7, the columns are identified and computed as follows:

Column 1: Time (minutes) = time from the beginning of the storm.

Column 2: i (inches/hour) = incremental intensities (from Table 2-6).

Column 3: Sum (i) = summation of all incremental intensities to the specified time.

Column 4: "Sum" (i lagged) = column 3 displaced a total time equal to the time of concentration for the area producing this hydrograph.

Column 5: (3) - (4) = column 3 - column 4.

Column 6: q_{tc}= column 5 divided by the number of time increments in the time of concentration for the area producing this hydrograph. This column expresses the average intensity over a period of time equal to the time of concentration for the area producing this hydrograph, as measured at the specified chronological time.

Column 7: Q (cubic feet per second) = column 6 x "C" x A (for the area producing this hydrograph). This column is for the rising limb calculation.

Column 8: Time Folded revised times and flows for falling limb of hydrograph; falling limb is mirror image of rising limb, but expanded to twice the length. Intermediate values can be linearly interpolated from neighboring values, since five (5) minute increments doubled to ten (10) minute increments leave out intervening values.

The computations were stopped in column 7 when the rising limb of the hydrograph reached its peak value. At this point, the time scale can be folded as shown in column 8. Doubling the time increments for the falling limb serves to double the volume that would have been under that portion of the runoff hydrograph. The volume under the entire discharge hydrograph will be three (3) times that under the rising limb.

With this assumption, the volume of runoff expressed as a percentage from an area with a runoff coefficient of 0.45 becomes approximately sixty seven and one half (67.5) percent rather than forty-five (45) percent of the rainfall. In this procedure the C value from the Rational Method formula represents the ratio of the peak runoff to the average rainfall intensity rate for a period equal to the time of concentration and not a simple runoff to rainfall ratio.

Table 2-7 Runoff Computations From A 100 Acre Area With A Time Of Concentration Of 40 Minutes And C = 0.45							
Time (Min) (1)	**I_{10} (In/Hr) (2)**	**Sum I_{10} (3)**	**Sum I_{10} (Lagged 40 min) (4)**	**Time (3) - (4) (5)**	**Q40 (In/Hr) (6)**	**Q (cfs) (7)**	**Folded (8)**
0							330
5	0.41	0.41		.41	.05	2.3	320
10	0.43	0.84		.84	.10	4.5	310
15	0.46	1.3		1.3	.16	7.2	300
20	0.48	1.78		1.78	.22	9.9	290
25	0.48	2.26		2.26	.28	12.6	280
30	0.6	2.86		2.86	.36	16.2	270
35	0.6	3.46		3.46	.43	19.3	260
40	0.72	4.18		4.18	.52	23.4	250
45	0.72	4.9	.41	4.5	.56	25.2	240
50	0.84	5.7	.84	4.9	.61	27.4	230
55	0.96	6.7	1.3	5.4	.67	30.1	220
60	1.08	7.8	1.78	6.0	.75	33.7	210
65	1.32	9.1	2.26	6.8	.85	38.2	200
70	1.56	10.7	2.86	7.8	.97	43.6	190

Table 2-7 (Continued) Runoff Computations From A 100 Acre Area With A Time Of Concentration Of 40 Minutes And C = 0.45							
Time (Min) (1)	**I_{10} (In/Hr) (2)**	**Sum I_{10} (3)**	**Sum I_{10} (Lagged 40 min) (4)**	**Time (3) - (4) (5)**	**Q40 (In/Hr) (6)**	**Q (cfs) (7)**	**Folded (8)**
75	2.16	12.8	3.46	9.3	1.16	52.2	180
80	2.88	15.7	4.18	11.5	1.44	64.8	170
85	4.32	20.0	4.9	15.1	1.89	85.1	160
90	8.64	28.7	5.7	23.0	2.87	129.1	150
95	6.0	34.7	6.7	28.0	3.5	157.5	140
100	3.48	38.1	7.8	30.3	3.8	171.0	130
105	2.4	40.5	9.1	31.4	3.92	176.4	120
110	1.8	42.3	10.7	31.6	3.95	177.7	(peak)
115	1.44	43.8	12.8	31.0	3.87	174.1	

2.5.0 SOIL CONSERVATION SERVICE METHODS

The Soil Conservation Service (SCS) hydrologic methods have been widely used by engineers and hydrologists for analyses of small urban watersheds. These methods resulted from extensive analytical work using a wide range of statistical data concerning storm patterns, rainfall-runoff characteristics and many hydrologic observations in the United States. The SCS utilizes a twenty-four (24) hour storm duration, which is considered to be acceptable for the Copperas Cove area; however, the design storm most representative of the Copperas Cove area has a three (3) hour duration. It should be noted that if the SCS storms are applied, the Type III distribution should be used.

The SCS methods can be applied to urban drainage areas of any size. A brief explanation of the runoff curve numbers, the tabular and graphical methods and the TR-20 method are introduced in this Section. The Supplemental Section 2.7.0 for the Soil Conservation Service hydrology includes the rainfall-runoff relationship and the dimensionless Unit Hydrograph. For detailed information, the user is referred to the following Soil Conservation Service publications. They are:

NEH-4: "Hydrology," Section 4, National Engineering Handbook
TR-20: Computer Program for Project Formulation, Hydrology
TR-55: Urban Hydrology for Small Watersheds
TP-149: A Method for Estimating Volume and Rate of Runoff in Small Watersheds

2.5.1 Left Blank Intentionally

2.5.2 Soil Conservation Service Runoff Curve Numbers

The Soil Conservation Service (SCS) has developed an index, the runoff curve number, to represent the combined hydrologic effect of soil type, land use, agricultural land treatment class, hydrologic condition, and antecedent soil moisture. These watershed factors have the most significant impact in estimating the volume of runoff, and can be assessed from soil surveys, site investigations and land use maps.

The curve number is an indication of the runoff producing potential of the drainage area for a given antecedent soil moisture condition, and it ranges in value from zero (0) to one hundred (100). The SCS runoff curve numbers are grouped into three (3) antecedent soil moisture conditions -- Antecedent Moisture Condition I, Antecedent Moisture Condition II and Antecedent Moisture Condition III. Values of runoff curve numbers for all three (3) conditions may be computed following guidelines in "Hydrology, Section 4," National Engineering Handbook. Antecedent Moisture Condition I is the dry soil condition and Antecedent Moisture Condition III is the wet soil condition. Antecedent Moisture Condition II is normally considered to be the average condition.

However, studies of hydroiogic data indicate that Antecedent Moisture Condition II is not the average throughout Texas. Instead, investigations have shown that the average condition ranges from Antecedent Moisture Condition I in west Texas to between Antecedent Moisture Condition II and Antecedent Moisture Condition III in east Texas. The values given in Table 2-10 are for an Antecedent Moisture Condition II. If it is desired to change to an Antecedent Moisture Condition I or III, the adjustments given in TR-55 or "Hydrology, Section 4," National Engineering Handbook should be used.

The SCS has classified more than four thousand (4,000) soils into four (4) hydroiogic groups, identified by the letters A, B, C, and D, to represent watershed characteristics.

Group A: (Low runoff potential). Soils having a high infiltration rate even when thoroughly wetted and consisting chiefly of deep, well-drained to excessively drained sands or gravels.

Group B: Soils having a moderate infiltration rate when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well-drained soils with moderately fine to moderately coarse texture.

Group C: Soils having a slow infiltration rate when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water or soil with moderately fine to fine texture.

Group D: (High runoff potential). Soils having a very slow infiltration rate when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.

The list of most soils in the United States along with their hydrologic soil classification is given in the TR-55 publication. The minimum infiltration rates for the four (4) soil groups are:

Group	Minimum Infiltration Rate (in/hr)
A	0.30 - 0.45
B	0.15 - 0.30
C	0.05 - 0.15
D	0.00 - 0.05

Table 2-13 lists the curve numbers for the four (4) soil groups under various land uses, land treatment and hydrologic conditions. In order to determine the soil classifications in the Copperas Cove area, the SCS Soil Survey of Coryell County, Texas should be used.

Table 2-10
SCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description		**Curve Numbers for Hydrologic Soil Group**			
Cover type and Hydrologic Condition	**Average % Impervious Area[1]**	**A**	**B**	**C**	**D**
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas: Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98

Table 2-10 (Continued) SCS Runoff Curve Numbers for Urban Areas and Agricultural Lands					
Cover Description		**Curve Numbers for Hydrologic Soil Group**			
Cover type and Hydrologic Condition	**Average % Impervious Area[1]**	**A**	**B**	**C**	**D**
Streets and roads:					
Paved; curbs and storms sewers (excluding right of way)		98	98	98	98
Paved open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing[2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80

Table 2-10 (Continued) SCS Runoff Curve Numbers for Urban Areas and Agricultural Lands					
Cover Description		**Curve Numbers for Hydrologic Soil Group**			
Cover type and Hydrologic Condition	**Average % Impervious Area[1]**	**A**	**B**	**C**	**D**
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element[3]	Poor Fair Good	48 35 30	67 56 48	77 70 65	83 77 73
Woods—grass combination (orchard or tree farm).[4]	Poor Fair Good	57 43 32	73 65 58	82 76 72	86 82 79
Woods[5]	Poor Fair Good	45 36 30	66 60 55	77 73 70	83 79 77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

[1] The average percent impervious area shown was used to develop the composite curve numbers. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a curve number of ninety eight (98) and pervious areas are considered equivalent to open space in good hydrologic condition.

[2] Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 0 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

[3] Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

[4] Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture.

[5] Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: Soil Conservation Service. TR-55: Urban Hydrology for Small Watersheds

2.5.3 Time of Concentration

The procedures for estimating time of concentration for the SCS method are described in the SCS's Technical Release 55 (TR-55). Three (3) types of flow (sheet flow, shallow concentrated flow and channel flow) are considered.

In hydrograph analysis, the time of concentration is the time from the end of excess rainfall to the point of inflection on the falling limb of the hydrograph. The time of concentration determines the shape of the runoff hydrograph. The time of concentration determines the shape of the runoff hydrograph. Times of concentration are required for the existing and developed conditions to adequately model the impact of the development on stormwater runoff. In general, times of concentration for the developed condition should be calculated based on conservative assumptions concerning the increased hydraulic efficiency expected with an ultimate developed condition. For instance, while sheet flow for existing conditions is typically limited to three hundred (300) feet, sheet flow for developed conditions should be limited to one hundred fifty (150) feet.

2.5.4 Peak Flow Calculation

The SCS has presented several methods for computing runoff hydrographs for drainage areas. The Tabular, Graphical and TR-20 methods are considered acceptable for the Copperas Cove area. The parameters required to calculate the hydrograph are the rainfall distribution, runoff curve numbers, time of concentration and drainage area.

A. **Tabular Method.** The Tabular Method can be used to develop composite flood hydrographs at any point within a watershed by dividing the watershed into subareas. The method is useful for watersheds where runoff hydrographs are needed from nonhomogeneous areas,

i.e., the watershed can be divided into homogeneous sub-areas. It is especially applicable for estimating the effects of land use change in a portion of the watershed. It should be noted that the tables in the TR-55 publication for the tabular method are based on the SCS twenty-four (24) hour rainfall distributions. The engineer should apply those tables corresponding to a Type III rainfall distribution which is acceptable for the Copperas Cove area.

The basic requirement for use of this method is the tabular discharge values for the different types of storm distributions. The tabular discharge values in csm/in (cubic feet of discharge per second per square mile of watershed per inch of runoff) are given in TR-55 for a range of times of concentration from one tenth (0.1) to two (2) hours and reach travel times of zero (0) to three (3) hours. The discharge values were developed from the TR-20 program by computing hydrographs for a one square mile drainage area at selected times of concentration and routing them through stream reaches with the range of travel times indicated.

The other input needed to develop the composite flood hydrograph includes the total runoff volume (Q_v) and the drainage area (A_m). The equation for calculating the flow

at any time is:

$$q = q_t A_m Q_v \qquad \text{(Eq. 2-6)}$$

where,

q = Hydrograph ordinate at hydrograph time t, cfs

q_t = Individual value read from the tabular discharge tables, CSM/inch

A_m = Drainage area of individual subwatershed, mi^2

Q_v = Total runoff volume, inches.

The composite flood hydrograph is obtained by submission of the individual subarea hydrographs at each time step. For measuring runoff from a nonhomogeneous watershed, the subdivision of the watershed into relatively homogeneous subareas is required. For additional information regarding the Tabular method the SCS publication TR-55 should be consulted.

B. **Graphical Method.** As in the Tabular Method the Graphical Method is based on hydrograph analyses using the TR-20 computer program. The Graphical Method provides a determination of peak discharge only. If a hydrograph is needed or watershed subdivision is required, use the Tabular or TR-20 methods. The TR-55 lists in detail the limitations of the Graphical Method and the engineer should be well aware of these before proceeding. The input requirements for the Graphical Method are as follows:

1. t_c(hrs)
2. Drainage Area (mi^2)
3. Type III rainfall distribution
4. 24-hr, rainfall (in.)
5. CN

The peak discharge equation for the graphical method is:

$$q_p = q_u A_m Q \qquad \text{(Eq. 2-7)}$$

*q_p = peak discharge (cfs)
q_u = unit peak discharge (csm/in)

A_m = drainage area (mi.^{2})

Q = runoff (in)

*Note the original SCS equation also has an Fp factor for pond and swamp conditions. This has been omitted since it is not applicable to the Coryell County region.

For additional information regarding the Graphical Method the SCS publication TR-55 should be consulted.

C. TR-20 Method. The TR-20 method is a computer program which develops runoff hydrographs for a watershed. The input information includes drainage area, time of concentration, SCS curve number, a specific rainfall distribution and the antecedent soil moisture condition.

The TR-20 program was developed by the SCS to assist in the hydrologic evaluation of flood events for use in analysis of water resource projects. Besides developing the runoff hydrograph from any synthetic or natural storm rainfall, the program provides the capability to route, add, store, divert or divide hydrographs to convey floodwater from the headwaters to the watershed outlets.

The program uses the procedures described in the SCS's National Engineering Handbook in "Hydrology, Section 4" except for the reach routing procedures. The modified Attenuation-Kinematic routing method is used for reach routing. Uniform rainfall depth and distribution over time are assumed over a subarea, groups of subareas or the whole watershed.

2.6.0 SUPPLEMENTAL SECTION: SOIL CONSERVATION SERVICE HYDROLOGY

2.6.1 Rainfall-Runoff Relationship

The SCS has developed a rainfall-runoff relationship to calculate the total runoff volume for a single storm. Based on the relationship between rainfall, runoff and retention (the rain not converted to runoff), an arithmetic equation for a storm without any initial abstraction can be expressed as:

$$F/S = Q/P \qquad \text{(Eq. S-1)}$$

where,

Q = Actual runoff volume
P = Rainfall (P is equal or greater than Q)
F = Actual retention after runoff begins
S = Potential maximum retention after runoff begins (S is equal to or greater than F)

The retention, S, is a constant for a particular storm because it is the maximum that can occur under the existing conditions if the storm continues without limit. The retention F varies because it is the difference between P and Q at any point on the mass curve, or:

$$F = P - Q \qquad \text{(Eq. S-2)}$$

The actual runoff (Q) can be solved as:

$$Q = p^2/(p+s) \qquad \text{(Eq.S-3)}$$

which is a rainfall-runoff relationship in which the initial abstraction is zero.

If an initial abstraction (I_a) greater than zero is considered, the amount available for runoff is P - $I_a$instead of P. By substituting (P - I_a) for P in equation S-1, the following equation results. The new arithmetic expression becomes:

$$F/S = Q/(P-I_a) \qquad \text{(Eq.S-4)}$$

where F≤S, and Q ≤ (P - I_a). The total retention for a storm consists of I_a and F. The total potential maximum retention (as P gets very large) consists of $1_a$and S.

The actual runoff is:

$$Q = ((P-I_a)+S) \qquad \text{(Eq.S-5)}$$

The initial abstraction (I_a) is a function of land use, treatment and condition, interception, infiltration, depression storage, and antecedent soil moisture. An empirical analysis performed by the SCS found that the initial abstraction is estimated as:

$$I_a=0.2S \qquad \text{(Eq.S-6)}$$

Thus, the runoff volume (Q) can be obtained from the volume of precipitation (P) and potential maximum retention (S) as follows:

$$Q = (P - 0.2\ S)^2/(P + 0.8S) \qquad \text{(Eq. S-7)}$$

Empirical studies indicate that S is a function of the curve number as follows:

$$S = (1000/CN)-10 \qquad \text{(Eq.S-8)}$$

Therefore, the runoff volume can be determined as a function of precipitation volume and curve number.

2.6.2 Soil Conservation Service Dimensionless Unit Hydrograph

To estimate the peak discharge and establish a runoff hydrograph in the SCS methods, the concept of a dimensionless unit hydrograph is applied. The SCS dimensionless unit hydrograph was derived from analysis of a large number of unit hydrographs developed using gage data from watersheds of a wide range in size and geographical location. The dimensionless unit hydrograph has ordinate values expressed in a dimensionless ratio q/qp and abscissa values of t/T_p, where q_p is the peak discharge at time T_p and q is the discharge at time t. Figure 2-3 in Appendix B of this Manual shows the shape of the dimensionless unit hydrograph. At the same time, the mass curve is also illustrated in Figure 2-3 in Appendix B of this manual with coordinates of Q_a/Q vs t/t_p, in which Q_a is the accumulated volume at time t, and Q is the total volume. Table 2-11 lists dimensionless discharge ratios and mass curve ratios for dimensionless time ratios for use in calculating unit hydrographs and mass curves.

The curvilinear unit hydrograph can be approximated by an equivalent triangular unit hydrograph, as shown by dotted lines in Figure 2-3 in Appendix B of this Manual. The area under the rising limb (before time T_p) of the two (2) unit hydrographs are the same. The time base of the dimensionless unit hydrograph is five (5) times the time-to-peak (T_p), while the time base of the triangular unit hydrograph is only-2.67 times the time-to-peak (T_p). The

transformation of curvilinear unit hydrograph to triangular unit hydrograph provides a solution for the peak flow.

A. **Derivation of Peak Flow.** The area under the triangular unit hydrograph on Figure 2-3 in Appendix B of this Manual equals the volume of direct runoff Q, which can be calculated by:

$$Q = q_p(T_p + T_r)/2 \qquad \text{(Eq.S-9)}$$

where,

Q = Direct runoff, inches

T_p = Time to peak, hours

T_r = Recession time, hours

q_p = Peak discharge, inches per hour

The runoff Q derived from this equation is the same as estimated by Equation S-7. By Equation S-9, the peak discharge q_p can be solved as:

$$q_p = 2Q/(T_p + T_r) \qquad \text{(Eq.S-10)}$$

Let $K = 2/(1 + T_r/T_p))$ (Eq. S-11)

therefore, $q_p = KQ/T_p$ (Eq. S-12)

where, Q = Direct runoff, inches

T_p = Time to peak, hours

T_r = Recession time, hours

q_p = Peak discharge, inches per hour

In making the conversion from inches per hour to cubic feet per second and putting the equation in terms ordinarily used, including drainage area (A) in square miles, and time (T) in hours, equation S-12 becomes the general equation:

$$q_p = (645.33\ KAQ)/T_p \qquad \text{(Eq. S-13)}$$

Where q_p is peak discharge in cubic feet per second and the conversion factor 645.33 is the rate required to discharge one (1) inch of excess rainfall from one (1) square mile in one (1) hour.

The relationship of the triangular unit hydrograph, shows that $T_r = 1.67\ T_p$ and gives K = 0.75 by Equation S-11 .Then substituting into equation S-13 gives:

$$q_p = 484A\ Q/T_p \qquad \text{(Eq. S-14)}$$

Since the volume under the rising side of the triangular unit hydrograph is equal to the volume under the rising side of the curvilinear dimensionless unit hydrograph in Figure 2-3 in Appendix B of this Manual, the constant 484, or peak rate factor, is valid for calculation of the peak discharge for the dimensionless unit hydrograph.

Table 2-11 Ratios for Soil Conservation Service Dimensionless Unit Hydrograph and mass Curve		
Time Ratios (t/T_p)	**Discharge Ratios (q/q_p)**	**Mass Curve Ratios (Q_a/Q)**
0.0	.000	.001
0.1	.030	.001
0.2	.100	.006
0.3	.190	.012
0.4	.310	.035
0.5	.470	.065
0.6	.660	.107
0.7	.820	.163
0.8	.930	.228
0.9	.990	.300
1.0	1.000	.375
1.1	.990	.450
1.2	.930	.522
1.3	.860	.589
1.4	.780	.650
1.5	.680	.700
1.6	.560	.751
1.7	.460	.790
1.8	.390	.822
1.9	.330	.849
2.0	.280	.871
2.2	.207	.908

Table 2-11 (Continued) Ratios for Soil Conservation Service Dimensionless Unit Hydrograph and mass Curve		
Time Ratios (t/T_p)	**Discharge Ratios (q/q_p)**	**Mass Curve Ratios (Q_a/Q)**
2.4	.147	.934
2.6	.107	.953
2.8	.077	.967
3.0	.055	.977
3.2	.040	.984
3.4	.029	.989
3.6	.021	.993
3.8	.015	.995
4.0	.011	.997
4.5	.005	.999
5.0	.000	1.000
Source: Soil Conservation Service. TR-55 Urban Hydrology for Small Watersheds.		

SECTION 3 - STREET FLOW

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SECTION 3 - STREET FLOW

3.1.0 GENERAL

The location of inlets and permissible flow of water in streets should be related to the extent and frequency of interference to traffic and the likelihood of flood damage to surrounding property for the 25 and 100 year frequency storms. Interference to traffic is regulated by design limits of the spread of water into traffic lanes, especially in regard to arterials. Flooding of surrounding property from streets is controlled by limiting curb buildup to the top of curb for a 25 year storm which is designated as the design storm. Conveyance provisions for the 100 year storm must also be made within defined right of way and easements.

3.1.1 Interference Due to Flow in Streets

Water which flows in a street, whether from rainfall directly onto the pavement surface or overland flow entering from adjacent land areas, will flow in the gutters of the street until it reaches an overflow point or some outlet, such as a storm sewer inlet. As the flow progresses downhill and additional areas contribute to the runoff, the width of flow will increase and progressively encroach into the traffic lane. On streets where parking is not permitted, as with many arterial streets, flow widths exceeding one traffic lane become a traffic hazard. Field observations show that vehicles will crowd adjacent lanes to avoid curb flow.

As the width of flow increases, it becomes impossible for vehicles to operate without moving through water in an inundated lane. Splash from vehicles traveling in the inundated lane obscures the vision of drivers of vehicles moving at a higher rate of speed in the open lane. Eventually, if width and depth of flow become great enough, the street loses its effectiveness as a traffic-carrier. During these periods, it is imperative that emergency vehicles such as fire trucks, ambulances and police cars be able to traverse the street by moving along the crown of the roadway.

3.1.2 Interference Due to Ponding

Storm runoff ponded on the street surface because of grade changes or because of the crown slope of intersecting streets has a substantial effect on the street-carrying capacity. The manner in which ponded water affects traffic is essentially the same as for curb flow; that is, the width of spread into the traffic lane is critical. Ponded water will often completely halt all traffic. Ponding in streets has the added hazard of surprise to drivers of moving vehicles, producing erratic and dangerous responses.

3.1.3 Street Cross Flow

Whenever storm runoff, other than limited sheet flow, moves across a traffic lane, a serious and dangerous impediment to traffic flow occurs. Cross-flow is allowed only in case of superelevation of a curve or overflow from the higher gutter on a street with cross fall. No more than three (3) cubic feet per second for the 25 year storm shall be allowed to cross flow from the higher elevation to the lower elevation.

3.1.4 Allowable Flow of Water Through Intersections

As the storm water flow approaches an arterial street or tee intersection, an inlet is required if more than three (3) cubic feet per second (cfs) for the 25 year storm shall enter the intersection. For a cul-de-sac with a slope greater than seven (7) percent, no more than three (3) cfs for the 25 year storm shall be allowed to enter the bulb of the cul-de-sac. In both situations the inlet cannot be placed inside the curb return.

3.1.5 Valley Gutter

Concrete valley gutters are useful in diminishing the deterioration of pavements, at intersections where slope across the intersection is less than one and two tenths (1.2%) percent. At the intersection of two (2) arterial streets, a valley gutter cannot be used. At the intersection of two (2) collector streets or local streets, a valley gutter shall be installed when slope across the intersection is less than one and two tenths (1.2 %) percent. At an intersection of two (2) different types of streets, the valley gutter may be used across the smaller street only.

3.2.0 PERMISSIBLE SPREAD OF WATER

The flow of water in gutters of various streets of different categories shall be limited by those values found on Table 3-1. These clear widths at the crown of the roadway or at the high point on a divided roadway are necessary to provide access for vehicles in the event of an emergency. Equation 3-1 may be used to determine the spread of gutter flow for a specific street width and flow depth.

$$\text{Spread} = W/2 \quad [(W^2/4) \quad 30y_oW^2/(30 + W)]^{1/2}, \qquad \text{(Eq. 3-1)}$$

where,

W = Street Width, feet

y_0 = Water depth in the gutter, feet

3.3.0 DESIGN METHOD

3.3.1 Gutter Flow Velocities

To insure scouring velocities for low flows, the gutter shall have a minimum slope of 0.004 feet per foot (0.4 percent).

3.3.2 Straight Crowns

Flow in gutters on straight crown pavements is normally assumed to be uniform, with Manning's Equation being used to determine the flow. However, because the hydraulic radius assumption in the Manning's Equation is not able to adequately describe the

hydraulic characteristics of the gutter cross section, modification of the equation is necessary to accurately compute the flow. The modified Manning's Equation is:

$$Q_o=0.56(z/n)S_o^{1/2}Y_o^{8/3} \qquad \text{(Eq. 3-2)}$$

where,

Q_o = Gutter discharge, cfs
z = Reciprocal of the crown slope, ft/ft
S_o = Street or gutter slope, ft/ft
n = Roughness coefficient
Y_o = Depth of flow in gutter, feet

Table 3-1
Minimum Clear Widths for Roadway Design Due to Gutter Flow*

Roadway Type	**Proposed Usage**	**Minimum Clear Width (Feet)**
1. Local Street	a. Residential b. Commercial/Industrial	0 0
2. Collector	a. Minor b. Commercial/Industrial c. Major 4 Lanes 5 Lanes 4 Lanes Divided 6 Lanes Divided	8 12 24 24 12 (each way) 12 (each way)
3. Arterial	a. 4 Lanes, Undivided b. 3 Lanes, One way c. 4 Lanes, One way d. 4 Lanes, with continuous left turn lane e. 4 Lanes, Divided f. 6 Lanes, Divided g. 8 Lanes, Divided	24 12 24 24 12 (each way) 12 (each way) 24 (each way)

The nomograph in Figure 3-1 in Appendix B of this Manual provides a direct solution for flow conditions in triangular channels. For a concrete pavement gutter, an n value equal to 0.016 is recommended. For gutters with small slope less than one (1) percent where sediment may accumulate, an n value of 0.02 is recommended.

3.3.3 Parabolic Crowns

Flows in the gutter of a parabolically crowned pavement are calculated from a variation of Manning's Equation, which assumes steady flow in a prismatic open channel. However, this equation is complicated and difficult to solve for each design case.

To provide a means of determining the flow in the gutter, generalized gutter flow equations for combinations of parabolic crown heights, curb splits and street grades of different street widths have been prepared. All of these equations have a logarithmic form.

Note: The street width used in this section is measured from face of curb to face of curb.

A. Streets Without Curb Split. Curb split is the vertical difference in elevation between curbs at a given street cross section. The gutter flow equation for parabolic crown streets without any curb split is:

$$\log Q = K_o + K_1 \log S_o + K_2 \log y_0 \qquad \text{(Eq. 3-3)}$$

where,

Q = Gutter flow, cfs

S_0 = Street grade, ft/ft

y_0 = Water depth in the gutter, feet

K_0, K_1, K_2 = Constant coefficients shown in Table 3-2 for different street widths:

Table 3-2
Coefficients for Equation 3-3, Streets Without Curb Split

Street Width* (ft)	Coefficients		
	K_0	K_1	K_2
30	2.85	0.50	3.03
36	2.89	0.50	2.99
40	2.85	0.50	2.89
44	2.84	0.50	2.83
48	2.83	0.50	2.78
60	2.85	0.50	2.74

B. Streets With Curb Split - Higher Gutter. The gutter flow equation for calculating the higher gutter flows is as follows:

$$\log Q = K_0 + K_1 \log S_o + K_2 \log y_o + K_3(CS) \qquad \text{(Eq. 3-4)}$$

where,

Q = Gutter flow, cfs

s_0 = Street grade, ft/ft

Y_0 = Water depth in the gutter, feet

CS = Curb split, feet

K_0, K_1, K_2, K_3 = Constant coefficients shown in Table 3-3 for different street widths:

Table 3-3
Coefficients for Equation 3-4, Streets With Curb Split - Higher Gutter

Street Width (ft)	Coefficients				Curb Split Range (ft)
	K_0	K_1	K_2	K_3	
30	2.85	0.50	3.03	-0.131	0.0-0.6
36	2.89	0.50	2.99	-0.140	0.0-0.8
40	2.85	0.50	2.89	-0.084	0.0-0.8
44	2.84	0.50	2.83	-0.091	0.0-0.9
48	2.83	0.50	2.78	-0.095	0.0-1.0
60	2.85	0.50	2.74	-0.043	0.0-1.2

Source: City of Austin, Watershed Engineering Division

C. Streets with Curb Split - Lower Gutter.

The gutter flow equation for the lower gutter is:

$$\log Q = K_0 + K_1 \log S_0 + K_2 \log y_0 + K_3(CS) \qquad \text{(Eq. 3-5)}$$

where,

Q = Gutter flow, cfs

S_0 = Street grade in ft/ft

y_0 = Water depth in the gutter in feet

CS = Curb split in feet

K_0, K_1, K_2, K_3= Constant coefficients shown in Table 3-4 for different street widths:

Table 3-4
Coefficients for Equation 3-5, Streets With Curb Split - Lower Gutter

Street Width (ft)	Coefficients				Curb Split Range (ft)
	K_0	K_1	K_2	K_3	
30	2.70	0.50	2.74	-0.215	0.0-0.6
36	2.74	0.50	2.73	-0.214	0.0-0.8
40	2.75	0.50	2.73	-0.198	0.0-0.8
44	2.76	0.50	2.73	-0.186	0.0-0.9
48	2.77	0.50	2.72	-0.175	0.0-1.0
60	2.80	0.50	2.71	-0.159	0.0-1.2

Source: City of Austin, Watershed Engineering Division

All the crown heights for different street widths are calculated by the following equation:

$$\text{Crown Height (feet)} = 0.5 + [(W \quad 30)/120] \qquad \text{(Eq. 3-6)}$$

where,

W = street width, feet D.

Parabolic Crown Location.

The gutter flow equation presented for parabolic crowns with split curb heights is based on a procedure for locating the street crown. The procedure allows the street crown to shift from the street center line toward the high one fourth (%) point of the street in direct proportion to the amount of curb split. The maximum curb split occurs with the crown at the one fourth (%) point of the street. The maximum allowable curb split for a street with parabolic crowns is 0.02 feet per foot of street width.

Example: Determination of Crown Location

Given: 0.4 feet Design split on 30-foot wide street.

Maximum curb split	= 0.02 x street width
	= 0.02 x 30 feet = 0.6 feet Maximum
Movement	= ¼ street width for 30 foot street
	= ¼ x 30 feet = 7.5 feet
Split Movement	=(Design split x W/Maximum Split x 4)
	= (0.4 x 30/.6 x 4) = 5 feet

Curb splits that are determined by field survey, whether built intentionally or not, should be considered when determining the capacity of the curb flow.

Special consideration should be given when working with cross sections which have the pavement crown above the top of curb. When the crown exceeds the height of the curb the maximum depth of water is equal to the height of the curb, not the crown height. It should be noted that a parabolic section where the crown equals the top of curb will carry more water than a section which has the crown one (1) inch above the top of curb.

SECTION 4-INLETS

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SECTION 4 - INLETS

4.1.0 GENERAL

The primary purpose of storm drain inlets is to intercept excess surface runoff and deposit it in a drainage system, thus reducing the possibility of surface flooding.

The most common location for inlets is in streets which collect and channelize surface flow, making it convenient to intercept. Because the primary purpose of streets is to carry vehicular traffic, inlets must be designed so as not to conflict with that purpose.

The following guidelines shall be used in the design of inlets to be located in streets:

A. Grated curb inlets are discouraged from use due to their increased tendency to clog and problems with replacement. In all instances where a curb inlet can be used in lieu of a grated curb inlet, it shall be required unless approval is given from the City Engineer.

B. Minimum transition for recessed inlets shall be ten (10) feet.

C. All curb inlets (whether in a sump or on grade) incorporate a standard five (5) inch depression. Unless otherwise approved in writing by City Engineer, all curb inlets shall be a minimum of ten (10) feet in length.

D. When recessed inlets are used, they shall not decrease the width of the sidewalk. Also, it should be noted that the use of recessed inlets must be approved by the City Engineer for all streets.

E. Design and location of inlets shall take into consideration pedestrian and bicycle traffic. In particular, grate inlets shall be designed to assure safe passage of bicycles.

F. Inlet design and location must be compatible with the criteria established in Section 3 of this Manual.

G. The use of slotted drains is discouraged except in instances where there is no alternative. If used, the manufacturer's design guidelines should be followed.

4.2.0 INLET CLASSIFICATIONS

Inlets are classified into two (2) major groups: (1) inlets in sumps where flow contributes from two (2) or more sides (Type S); and (2) inlets on grade (Type G). The following list references the various inlet types. (See Figures 4-1 through 4-7 in Appendix B of this Manual).

Inlets in Sumps	
(1) Curb Opening	Type S-1
(2) Grate*	Type S-2
(3) Combination (Grate and Curb Opening)*	Type S-3
(4) Area Without Grate	Type S-4
Inlets on Grade	
(1) Curb Opening	Type G-1
(2) Grate*	Type G-2
(3) Combination (Grate and Curb Opening)*	Type G-3

Recessed inlets are identified by the suffix (R), i.e.: S-1(R).

* For the flow capacity through the grate inlets, the Engineer should check appropriate vendor catalog.

4.3.0 STORM INLET HYDRAULICS

4.3.1 Inlets In Sumps

Inlets in sumps are inlets at low points with gutter flow contributing from two (2) or more sides. The capacity of inlets in sumps must be known in order to determine the depth and width of ponding for a given discharge. Sump inlets should be designed using Figure 4-8 in Appendix B of this Manual for an unsubmerged inlet or Figure 4-9 in Appendix B of this Manual for submerged conditions, regardless of what depth of depression exists at the inlet.

A. **Curb Opening Inlets (Type S-1) and Area Inlet Without Grate (Type S-4).**

Unsubmerged curb opening inlets (Type S-1) and area inlets without grates (Type S-4) in a sump function as rectangular weirs with a coefficient of discharge of 3.0. Their capacity shall be based on the following equation:

$$Q = 3.0h^{1.5}L \qquad \text{(Eq. 4-1)}$$

where,

Q = Capacity of curb opening inlet or of area inlet, cfs

h = Head at the inlet, feet, = $a + Y_0$

L = Length of opening through which water enters the inlet, feet

Figure 4-8 in Appendix B of this Manual provides for direct solution of the above equation.

Curb opening inlets and drop inlets in sumps have a tendency to collect debris at their entrances. For this reason, the calculated inlet capacity shall be reduced by ten (10) percent to allow for clogging.

B. Grate Inlets (Type S-2).

An area inlet with a grate (Type S-2) in a sump functions as an orifice with a coefficient of discharge of 0.60. Therefore, the orifice equation becomes:

$$Q = 4.82Ah^{0.5} \qquad \text{(Eq. 4-2)}$$

where,

Q = Capacity, cfs
h = Depth of flow at inlet, feet
A = Area of grate opening, square feet

The curves shown in Figure 4-9 in Appendix B of this Manual provide for direct solution of the above equation.

Area inlets with grates in sumps have a tendency to clog from debris which becomes trapped by the inlet. For this reason, the calculated inlet capacity of a grate inlet shall be reduced by fifty (50) percent to allow for clogging. Since the clogging problems require maintenance, grate inlets in sumps are discouraged.

C. Combination Inlets (Type S-3).

The capacity of a combination inlet Type S-3 consisting of a grate and curb opening in a sump shall be considered to be the sum of the capacities obtained from Figures 4-8 and 4.9 in Appendix B of this Manual. When the capacity of the gutter is not exceeded, the grate inlet accepts the major portion of the flow.

Combination inlets in sumps have a tendency to clog and collect debris at their entrances. For this reason, the calculated inlet capacities shall be reduced by their respective percentages indicated previously (which are ten (10) percent for a curb opening and fifty (50) percent for grate inlets).

D. Recessed Inlets in Sumps. (Type S-1(R), Type S-3(R))

Recessed inlets can be either curb opening or combination types. The clogging factors shall remain the same for recessed or non-recessed inlets.

4.3.2 Inlets On Grade With Gutter Depression A.

Curb Opening Inlets on Grade (Type G-1).

The capacity of a depressed curb inlet should be determined by use of Figures 4-10 and 4-11 in Appendix B of this Manual. Because the inlet is on a slope and there is no grate to catch debris, the majority of the debris will be carried downstream; therefore, no reduction for clogging is necessary.

B. Grate Inlets on Grade (Type G-2).

The depression of the gutter at a grate inlet decreases the flow past the outside of the grate. The effect is the same as that caused by the depression of a curb inlet.

The bar arrangements for grate inlets greatly affect the efficiency of the inlet. In order to determine the capacity of a grate inlet on grade, the appropriate vendor catalog should be checked (see Bibliography, Item 4-3 of this Manual).

Grate inlets have a tendency to trap debris such as leaves and paper being carried by the gutter flows. This causes traffic problems from ponding water and requires maintenance. A reduction factor of thirty (30) percent to allow for clogging should be applied.

C. Combination Inlets on Grade (Type G-3).

Combination inlets (curb opening plus grate) have greater hydraulic capacity than curb opening inlets or grate inlets of the same length. Generally speaking, combination inlets are the most efficient of the three (3) types of inlets on grade presented in this manual. The basic difference between a combination inlet and a grate inlet is that the curb opening receives the carry-over flow that passes between the curb and the grate. The reduction factor for clogging of this type of inlet shall be zero (0) percent for the curb opening and thirty five (35) percent for the grate inlet.

D. Recessed Inlets on Grade (Type G-1R, G-3R).

Capacities for recessed inlets on grade shall be calculated as 0.75 times the capacity for non-recessed inlets. The clogging factors shall remain the same for the various types of inlets.

4.3.3 Example 4-1

Given: Parabolic crown street width = thirty (30) feet

Cross Slope = zero (0) ft/ft

Street Grade = five (5) 0 percent

Q_a in one gutter = twelve (12) cfs

Find: Capacity of a ten (10) foot curb inlet on grade (Type G-1) with a five (5) inch gutter depression.

Step 1. From Equation 3-3 (Section 3 of this Manual) depth of flow in gutter is y_0= 0.43 feet, of 5.1 inches.

Step 2. Enter Fig. 4-10 with y_0 = 0.43 feet and a = 5 inches and find corresponding Q_a/L_a= 0.90

Step 3. Compute L_a= 12/0.90 = 13.33.

Step 4. Compute L/L_a= 10/13.33 = 0.75.

Step 5. Enter Figure 4-11 (in Appendix B of this Manual) with L/L_a0.75 and a/y = 0.98 and find corresponding Q/Q_a= 0.84.

Step 6. Determine Q from Q/Q_a

Q = 0.84 (12)= 10.1 cfs

Step 7. Determine Qpass
Q_{pass}= 12-10.1 = 1.9 cfs

Step 8. The by-pass flow is 1.90 cubic feet per second.

4.4.0 INLET SYSTEM LAYOUT

The following is intended to provide a general step by step procedure for the layout of an inlet system utilizing the information that has been provided in Chapters 3 and 4 of this Manual. This information is in no way a requirement for design and is provided solely for the benefit of the Engineer or designer.

4.4.1 Preliminary Design Considerations

A. Prepare a drainage map of the entire area to be drained by proposed improvements. Contour maps serve as excellent drainage area maps when supplemented by field observation.

B. Outline the drainage area for each inlet in accordance with present and future street development. Show all existing underground utilities.

C. Make a tentative layout of the proposed storm drainage system, locating all inlets, manholes, mains, laterals, ditches, culverts, etc.

D. Establish the design rainfall frequency.

E. Establish the minimum inlet time of concentration.

F. Establish the typical cross section of each street.

G. Establish the permissible spread of water on all streets within the drainage area.

H. Indicate each drainage area, the size of area, the direction of surface runoff by small arrows and the coefficient of runoff for the area.

4.4.2 Inlet System Design

Determining the size and location of inlets is largely a trial and error procedure. Based on criteria outlined in Sections 2, 3 and 4 of this Manual, the following steps will serve as a guide to the procedure to be used.

Step 1. Beginning at the upstream end of the project drainage basin, outline a trial subarea and calculate the runoff from it.

Step 2. Compare the calculated runoff to allowable street capacity. If the calculated runoff is greater than the allowable street capacity, reduce the size

of the trial subarea. If the calculated runoff is less than street capacity, increase the size of the trial subarea. Repeat this procedure until the calculated runoff equals the allowable street capacity. This is the first point at which a portion of the flow must be removed from the street. The percentage of flow to be removed will depend on street capacities versus runoff entering the street downstream.

Step 3. Record the drainage area, time of concentration, runoff coefficient and calculated runoff for the subarea. This information shall be recorded on the plans or in tabular form similar to that shown in Table 4-1 convenient for review.

Step 4. If an inlet is to be used to remove water from the street, determine and record the inlet size, amount of intercepted flow and amount of flow carried over (bypassing the inlet).

Step 5. Continue the above procedure for other subareas until a complete system of inlets has been established. Remember to account for carry-over from one inlet to the next.

Step 6. After a complete system of inlets has been established, modification should be made to accommodate special situations such as point sources of large quantities of runoff, and variation of street alignments and grades.

Step 7. Record information as in Steps 3 and 4 above for all inlets.

Step 8. After the inlets have been located and sized the inlet pipes can be designed (see Section 5 of this Manual).

4.4.3 Inlet Flow Calculation Table

An example of a calculation table for inlet flow design is shown in Table 4-1 of this Manual.

The following is an explanation of each column in Table 4-1:

Column 1. Inlet number. All inlets are classified with a designated number.

Column 2. Drainage area number. List all numbers of the drainage areas which drain stormwater into inlet number in Column 1.

Column 3. The corresponding discharge from the drainage areas in Column 2.

Column 4. The carry-over flow (Q_{pass}) in this column is the quantity of water which has passed by the last preceding inlet to the inlet under consideration.

Column 5. The total run-off, Q_a, is the run-off from Column 3 plus the carry-over from preceding drainage areas.

Column 6. The slope, S, expressed in percentage, is obtained from established grade lines as shown on the plan-profile sheets, or from specified data.

Column 7. Gutter depression.

Column 8. The water depth, Y_0, in the gutter is expressed in feet." Y_0 " can be determined from Equation 3-1 or Figure 3-1 (in Appendix B of this Manual) for the straight crown streets and determined from Equations 3-3, 3-4 or 3-5 for the parabolic crown streets.

Column 9. The value of the ponded width is the product of the water depth (in Column 7) and the reciprocal of the cross slope (z) in the Equation 3-2. The ponding width must be kept within the maximum permissible ponded limit of the streets.

Column 10. The reduction factor for each inlet as specified in Section 4.3.0 of this Manual.

Column 11. Q_a/L_a is read from Figure 4-10 in Appendix B of this Manual by the gutter depression and gutter flow depth.

Column 12. L_a is calculated from Q_a divided by the value in Column 11. L_a represents the length of an inlet for one hundred percent (100) percent interception.

Column 13. Length of the inlet L.

Column 14. The ratio of L/L_a.

Column 15. The ratio of gutter depression (in feet) to water depth in the gutter (in feet).

Column 16. The ratio of Q/Q_a. The value is read from Figure 4-11 in Appendix B of this Manual.

Column 17. Q is the flow intercepted by the inlet of length L.

Column 18. The carry-over flow (Q_{pass}) is the result of Q_a-Q.

Column 19. This column is used to specify the inlet information.

Table 4-1 Inlet Flow Calculation Table

INLET FLOW CALCULATION TABLE

INLET NUMBER	DRAINAGE AREA NO.	Q (CFS)	Q PASS (CFS)	Q TOTAL (Qa) (CFS)	SLOPE (%)	a (IN)	y_o (FT)	PONDED WIDTH (FT)	R.F. (%)	Qa/La	La (FT)	LENGTH (FT)	L/La	a/y_o	Q/Qa	Q (CFS)	Q pass (CFS)	REMARK
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Source: City of Austin Drainage Criteria Manual

SECTION 5 - STORM DRAINS

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SECTION 5 - STORM DRAINS

5.1.0 GENERAL

The purpose of this section is to consider the hydraulic aspects of storm drains and their appurtenances in a storm drainage system. Hydraulically, storm drainage systems consist of conduits (open or enclosed) in which unsteady and non-uniform flow exists. The design storm shall be the 25 year storm with provisions made for the 100 year storm as noted in Section 3 of this Manual.

5.2.0 DESIGN GUIDELINES

The following rules are to be observed in the design of storm drain system components to be located in public right-of-way or public drainage easements in order to promote proper operation and to minimize maintenance of those systems:

A. Select pipe size and slope so that the velocity of flow will increase progressively or at least will not appreciably decrease at inlets, bends or other changes in geometry or configuration.

B. Do not discharge the contents of a larger pipe into a smaller one even though the capacity of the smaller pipe may be greater due to a steeper slope.

C. For all pipe junctions other than a manhole, the angle of intersection between any two flow paths shall not be greater than forty-five (45) degrees. This includes discharges into box culverts and channels.

E. No proposed pipe having a diameter greater than fifty (50) percent of the minimum dimension of an existing box culvert shall be allowed to discharge into that box culvert. Exceptions must be justified by structural engineering analysis.

G. Pipe shall be reinforced concrete. Concrete pipe shall be manufactured and installed in compliance with the City of Copperas Cove – Standards for Public Works Construction.

H. The 25 year hydraulic grade line shall remain six (6) inches below the theoretical gutter flow line of inlets.

5.3.0 DESIGN PARAMETERS

5.3.1 Minimum Grades

Storm drains should operate with velocities of flow sufficient to prevent deposition of solid material. The controlling velocity is near the bottom of the conduit and is considerably less than the mean velocity. Storm drains should be designed to have a minimum velocity of two and one half (2.5) feet per second (fps).

5.3.2 Maximum Velocities

Maximum velocities in conduits are important because of the possibility of excessive erosion of the storm drain pipe material. Table 5-1 lists the maximum velocities allowed.

Table 5-1
Maximum Velocity In Storm Drains

Type	Maximum Permissible Velocity
Storm Drains (inlet laterals)	No limit
Storm Drains (trunk)	20 fps

5.3.3 Minimum Diameter

Pipes that are to become an integral part of the public storm sewer system shall have a minimum diameter of eighteen (18) inches.

5.3.4 Roughness Coefficients

The coefficients of roughness listed in Table 5-2 are for use in Manning's Equation.

Table5-2 Roughness Coefficients "n" For Storm Drains	
Materials of Construction	Minimum Design Coefficient
Concrete	0.013
Corrugated-metal Pipe	0.024
Plain or Coated Paved Invert (Asphalt)	0.020
Plastic Pipe Smooth Perforated	0.010 0.020

5.4.0 FLOW IN STORM DRAINS

All storm drains shall be designed by the application of the Continuity Equation and Manning's Equation either through the appropriate charts and nomographs or by direct solution of the equations as follows:

5.4.1 Flow Equation Method

$Q = AV$ and (Eq.5-1)

$Q = (1.49/n)AR^{2/3}S^{1/2}$ (Eq. 5-2)

where,

Q	= Pipe Flow, cfs
A	= Cross-sectional area of flow, ft^2
V	= Velocity of flow, ft/sec
n	= Coefficient of roughness of pipe
R	= Hydraulic radius = A/Wp, ft
S	= Friction slope in pipe, ft/ft
W_p	= Wetted perimeter, ft

5.4.2 Nomograph Method

Nomographs for determining flow properties in circular pipe, elliptical pipe and pipe-arches are given here as Figures 5-1 through 5-9 in Appendix B of this Manual. The nomographs are based upon a value of "n" of 0.012 for concrete and 0.024 for corrugated metal. The charts are self-explanatory, and their use is demonstrated by the following examples in this Section.

For values of "n" other than 0.012, the value of Q should be modified by using the following formula:

$$Q_c = 0.012\ Q_n/n_c$$

where, Q_c = Flow based upon n_c

n_c = Value of "n" other than 0.012

Q_n = Flow from nomograph based on n = 0.012

This formula can be used in two (2) ways. If n_c = 0.015 and Q_c is unknown, use the known values to find Q_n from the nomograph, and then use the formula to convert Q_n to the required Q_c. If Q_c is one of the known values, use the formula to convert Q_c (based on n_c) to Q_n (based on n = 0.012) first, and then use Q_n and the other known values to find the unknown variable on the nomograph.

Example 5-1:

Given: Slope = 0.005 ft/ft
d = depth of flow =1.8 feet
D = diameter = 36 inches
n = 0.018

Find: Discharge (Q).

First determine d/D = 1.8'/3.0' = 0.6. then enter Figure 5-1 (in Appendix B of this Manual) to read Q_n= 34 cfs. From the formula, Q_c= 34 (0.012/0.018) = 22.7 cfs.

Example 5-2:

Given: Slope = 0.005 ft/ft
D = diameter = 36 inches
Q = 22.7 cfs
n = 0.018

Find: Velocity of flow (ft/sec).

First convert Q_c to Q_n so that nomograph can be used. Using the formula Q_n= 22.7 (0.018)/(0.012) = 34 cfs, enter Figure 5-1 (in Appendix B of this Manual) to determine d/D = 0.6. Now enter Figure 5-3 (in Appendix B of this Manual) to determine V = 7.5 ft/sec.

5.5.0 HYDRAULIC GRADIENT

In storm drain systems flowing full, all losses of energy are a function of resistance of flow in pipes or by interference with flow patterns at junctions. These losses must be accounted for by their accumulation along the system from its tailwater elevation at the outlet to its upstream inlet. The purpose of determining head losses is to include these values in a progressive calculation of the hydraulic gradient. In this way, it is possible to determine the hydraulic gradient line which will exist along the storm drain system. The hydraulic gradient line shall be computed and plotted for all sections of a storm drain system flowing full or under pressure flow. The determination of friction loss and minor loss are important for these calculations.

5.5.1 Friction Losses

Friction loss is the energy required to overcome the roughness of the pipe and is expressed as:

$$h_f = (29n^2/R^{1.33})(V^2/2g)L \qquad \text{(Eq. 5-3)}$$

where,

h_f = Friction loss, ft
n = Manning's Coefficient
L = Length of pipe, ft
R = Hydraulic radius, ft
V = Velocity of flow, ft/sec
g = Acceleration due to gravity, 32 ft/sec^2

In addition to Equation 5-3, Table 5-3 can be used to determine the friction slope and applied in Equation 5-4.

$$h_f = S_f L \qquad \text{(Eq.5-4)}$$

where,

h_f = Friction loss, feet
S_f = Friction slope, feet = $(Q/C)^2$
L = Length of pipe, feet
C = Full flow coefficient from Table 5-3
Q = Discharge, cfs

Example 5-3:

Given: Discharge Q = 24 cfs, diameter D = 24 inches, the length of pipe L=300 feet and n = 0.013

Find: The friction loss H_f

First, from Table 5-3 for D = 24 inches and n = 0.013, the full flow coefficient C = 226.

Second, the friction slope $S_f = (Q/C)^2 = 0.011$

The friction loss $H_f = S_f L = 3.3$ feet

Table 5-3
Full Flow Coefficient Values for Circular Concrete Pipe

D Pipe Diameter (inches)	A Area (square feet)	R Hydraulic Radius (feet)	Value of C* for			
			n = 0.010	n = 0.011	n = 0.012	n = 0.013
8	0.349	0.167	15.8	14.3	13.1	12.1
10	0.545	0.208	28.4	25.8	23.6	21.8
12	0.785	0.250	46.4	42.1	38.6	35.7
15	1.227	0.312	84.1	76.5	70.1	64.7
18	1.767	0.375	137	124	114	105
21	2.405	0.437	206	187	172	158
24	3.142	0.500	294	267	245	226
27	3.976	0.562	402	366	335	310
30	4.909	0.625	533	485	444	410
33	5.940	0.688	686	624	574	530
36	7.069	0.750	867	788	722	666
42	9.621	0.875	1308	1189	1090	1006
54	15.904	1.125	2557	2325	2131	1967
60	19.635	1.250	3385	3077	2821	2604

Table 5-3 (Continued) Full Flow Coefficient Values for Circular Concrete Pipe						
D Pipe Diameter (inches)	**A Area (square feet)**	**R Hydraulic Radius (feet)**	**Value of C* for**			
			n = 0.010	**n = 0.011**	**n = 0.012**	**n = 0.013**
66	23.758	1.375	4364	3967	3636	3357
72	28.274	1.500	5504	5004	4587	4234
78	33.183	1.625	6815	6195	5679	5242
84	38.485	1.750	8304	7549	6920	6388
90	44.170	1.875	9985	9078	8321	7681
96	50.266	2.000	11850	10780	9878	9119
102	56.745	2.125	13940	12670	11620	10720
108	63.617	2.250	16230	14760	13530	12490
114	70.882	2.375	18750	17040	15620	14420
120	78.540	2.500	21500	19540	17920	16540
126	86.590	2.625	24480	22260	20400	18830
132	95.033	2.750	27720	25200	23100	21330
138	103.870	2.875	31210	28370	26010	24010
144	113.100	3.000	34960	31780	29130	26890
* $C = (1.486/n)AR^{0.667}$						
Source: American Concrete Pipe Association. Concrete Pipe Design Manual.						

5.5.2 Minor Losses

From the point at which stormwater enters the drainage system at the inlet until it discharges at the outlet, it encounters a variety of hydraulic structures such as manholes, bends, enlargements, contractions and other transitions. These structures will cause head losses which are called "minor head losses."

The minor head losses are generally expressed in a form derived from the Bernoulli and Darcy-Weisbach Equations:

$$h = KV^2/2g \qquad \text{(Eq. 5-5)}$$

where, h = velocity head loss, feet
K = coefficient for head loss

The following are minor head losses of hydraulic structures commonly found in a storm drainage system.

A. Junction Losses. Equation 5-6 is used to determine the head loss at a junction of two (2) pipes, with the various conditions of the coefficient Ki given in Table 5-4.

$$h^j = (V_2^2 - K_j V_1^2)/2g \qquad \text{(Eq. 5-6)}$$

where, V_1 = Velocity for inflowing pipe, ft/sec.

V_2 = Velocity for outflowing pipe, ft/sec.

K_j = Junction or structure coefficient of loss.

The detailed design information for junction losses can be found in the Bibliography of this Manual, Item 5-10.

B. Bend Losses. The minor head loss at a bend results from a distortion of the velocity distribution, thereby causing additional shear stresses within the fluid. The bend loss is considered to be that in excess of the loss for an equal length of straight pipe. The equation to compute the bend loss is:

$$h_b = K_b v^2/2g \qquad \text{(Eq. 5-7)}$$

The coefficient K_b varies with the angle of the bend. Table 5-4 and Figure 5-11 in Appendix B of this Manual show the different K_b coefficients used in bend losses.

Table 5-4 Junction or Structure Coefficient of Loss			
Cases	**Reference Figure**	**Description of Condition**	**Coefficient K_j**
A	5-10	Manhole on Main Line with 45° Branch Lateral	0.50
B	5-10	Manhole on Main Line with 90° Branch Lateral	0.25
C	5-11	45° Wye Connection or cut-in	0.75
D	5-11	Inlet or Manhole at Beginning of Main Line or Lateral	1.25
E	5-11	Conduit on Curves for 90°* Curve radius = diameter Curve radius = (2 to 8) diameter Curve radius = (8 to 20) diameter	 0.50 0.40 0.25
F	5-11	Bends where radius is equal to diameter 90° bend 60° bend 45° bend $22^1/_2$°bend Manhole on line with 60° Lateral Manhole on line with $22^1/_2$° Lateral	 0.50 0.43 0.35 0.20 0.35 0.75
*Where bends other than 90 degrees are used, the 90 degree bend coefficient can be used with the following percentage factor applied: 60° Bend - 85%; 45° Bend - 70%; $22^1/_2$° Bend - 40%			
Source: City of Austin Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.			

C. **Transition Losses.** The head losses resulting from sudden and gradual changes in the cross section or flow direction are included in this category. Four (4) transition losses are discussed here.

1. Sudden Enlargement. Table 5-5 shows the coefficients used in the different cases for head losses due to a sudden enlargement.
2. Gradual Enlargement. Table 5-6 shows the coefficients for calculating the head loss based on the angle of the cone transition.
3. Sudden Contraction. Table 5-7 illustrates the values of coefficients in determining the head loss due to a sudden contraction.
4. Gradual Contraction. The head losses due to a gradual contraction are determined by the following equation with a constant head loss coefficient.

$$h_{gc} = 0.04\ V^2/2g \qquad \text{(Eq. 5-8)}$$

where, V = velocity for smaller pipe.

Table 5-5
Values of K for Determining Loss of Head Due to Sudden Enlargement in Pipes, from the Formula H = K ($V^2/2g$)

d_2/d_1	Velocity, V, fps										
	2	3	4	5	6	7	8	10	12	15	20
1.2	.11	.10	.10	.10	.10	.10	.09	.09	.09	.09	.09
1.4	.26	.26	.25	.24	.24	.24	.24	.23	.23	.22	.22
1.6	.40	.39	.38	.37	.37	.36	.36	.35	.35	.34	.33
1.8	.51	.49	.48	.47	.47	.46	.46	.45	.44	.43	.42
2.0	.60	.58	.56	.55	.55	.54	.53	.52	.52	.51	.50
2.5	.74	.72	.70	.69	.68	.67	.66	.65	.64	.63	.62
3.0	.83	.80	.78	.77	.76	.75	.74	.73	.72	.70	.69
4.0	.92	.89	.87	.85	.84	.83	.82	.80	.79	.78	.76
5.0	.96	.93	.91	.89	.88	.87	.86	.84	.83	.82	.80
10.0	1.00 1.00	.99 1.00	.96 .98	.95 .96	.93 .95	.92 .94	.91 .93	.89 .91	.88 .90	.86 .88	.84 .86

V = velocity in smaller pipe
d_2/d_1 = ratio of diameter of larger pipe to diameter of smaller pipe

Source: Brater, E.F. and H.W. King. Handbook of Hydraulics, 1976.

Table 5-6
Values of K for Determining Loss of Head Due to Gradual Enlargement in Pipes from the Formula $H = K (v^2/2g)$

Angle of cone*

d_2/d_1	2°	4°	6°	8°	10°	15°	20°	25°	30°	35°	40°	45°	50°	60°
1.1	.01	.01	.01	.02	.03	.05	.10	.13	.16	.18	.19	.20	.21	.23
1.2	.02	.02	.02	.03	.04	.09	.16	.21	.25	.29	.31	.33	.35	.37
1.4	.02	.03	.03	.04	.06	.12	.23	.30	.36	.41	.44	.47	.50	.53
1.6	.03	.03	.04	.05	.07	.14	.26	.35	.42	.47	.51	.54	.57	.61
1.8	.03	.04	.04	.05	.07	.15	.28	.37	.44	.50	.54	.58	.61	.65
2.0	.03	.04	.04	.05	.07	.16	.29	.38	.46	.52	.56	.60	.63	.68
2.5	.03	.04	.04	.05	.08	.16	.30	.39	.48	.54	.58	.62	.65	.70
3.0	.03	.04	.04	.05	.08	.16	.31	.40	.48	.55	.59	.63	.66	.71
	.03	.04	.04	.06	.08	.16	.31	.40	.49	.56	.60	.64	.67	.72

* Angle of cone is twice the angle between the axis of the cone and its side.
V = velocity in smaller pipe.
d_2/d_1 = ratio of diameter of larger pipe to diameter of smaller pipe.

Source: Brater, E.F. and H.W. King. Handbook of Hydraulics, 1976.

Table 5-7 Values of K for Determining Loss of Head Due to Sudden Contraction in Pipe From the Formula H = K ($V^2/2g$)											
	Velocity, V in feet per second										
d_2/d_1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**
1.1	.03	.04	.04	.04	.04	.04	.04	.04	.04	.04	.05
1.2	.07	.07	.07	.07	.07	.07	.07	.08	.08	.08	.09
1.4	.17	.17	.17	.17	.17	.17	.17	.18	.18	.18	.18
1.6	.26	.26	.26	.26	.26	.26	.26	.26	.26	.25	.25
1.8	.34	.34	.34	.34	.34	.34	.33	.33	.32	.32	.31
2.0	.38	.38	.37	.37	.37	.37	.36	.36	.35	.34	.33
2.2	.40	.40	.40	.39	.39	.39	.39	.38	.37	.37	.35
2.5	.42	.42	.42	.41	.41	.41	.40	.40	.39	.38	.37
3.0	.44	.44	.44	.43	.43	.43	.42	.42	.41	.40	.39
4.0	.47	.46	.46	.46	.45	.45	.45	.44	.43	.42	.41
5.0	.48	.48	.47	.47	.47	.46	.46	.45	.45	.44	.42
10.0	.49 .49	.48 .49	.48 .48	.48 .48	.48 .48	.47 .47	.47 .47	.46 .47	.46 .46	.45 .45	.43 .44
V = velocity in smaller pipe d_2/d_1 = ratio of diameter of larger pipe to diameter of smaller pipe											
Source: Brater, E.F. and H.W. King. Handbook of Hydraulics, 1976.											

5.5.3 Hydraulic Gradient Calculation Table

After computing the quantity of storm runoff entering each inlet, the storm drain system required to convey the runoff can be designed. The ground line profile is now used in conjunction with the previous runoff calculations. Table 5-8 can be used to keep track of the pipe design and corresponding hydraulic grade line calculations. Note that the computations begin at the downstream discharge point and continue upstream through the pipe system.

The following is an explanation of each of the columns in Table 5-8:

Column 1. Design Point; this point is the first junction point* upstream.
* "Junction Point" refers to any inlet, manhole, bend, etc. that occurs which would cause a minor head loss.

Column 2. Junction point immediately downstream of design point.

Column 3. Distance between one (1) and two (2) in feet.

Column 4. Design discharge as determined in inlet calculations. (See Table 4-1).

Column 5. Size of pipe chosen to carry an amount equal to or greater than the design discharge (Figures 5-12 and 5-15 in Appendix B of this Manual can be used to determine this).

Column 6. Slope of frictional gradient (can be determined from Table 5-3 using $(Q/C)^2=S_f$).

Column 7. Elevation of hydraulic gradient (hg) at upstream end of pipe = elevation of downstream end + Column 6 times Column 3, or elevation at upstream end + d/D if pipe is not flowing under pressure flow conditions.

Column 8. Elevation of hydraulic gradient at downstream end of pipe (Note: at outfall point assume hg is at top of pipe or above if actual tailwater elevation exists).

Column 9. Velocity of flow in incoming pipe at design point (use Q=AV for full flow and Figures 5-1 and 5-3 in Appendix B of this Manual for partial flow).

Column 10. Velocity of flow in outgoing pipe at design point.

Column 11. Velocity head loss for outgoing pipe at design point.

Column 12. Velocity head loss for incoming pipe at design point.

Column 13. Head loss coefficients at junction (see Figures 5-10 and 5-11 in Appendix B of this manual).

Column 14. Column 12 times Column 13.

Column 15. Column 11 - Column 14 (Note for bends and inlets or manholes at the beginning of a line, $V_1= V_2$. The appropriate K_j value should be used in Column 14 and Column 14 = Column 15).

Column 16. Column 7 + Column 15.

Column 17. Invert elevation at design point for incoming pipe.

Column 18. Invert elevation at design point for outgoing pipe.

Table 5-8 Hydraulic Computations Storm Sewers

MANHOLES/ INLETS		DIST.	DISCHARGE	PIPE SIZE	FRICTION GRADE	HYDR. GRADIENT		V_1 INFLOW	V_2 OUTFLOW	$\frac{V_2^2}{2g}$	$\frac{V_1^2}{2g}$	K_j	$\frac{K_j V_1^2}{2g}$	h	H.G.EL. DESIGN PT.		INV. IN	INV. OUT
						UP STREAM	DOWN STREAM											
FROM	TO	FEET	c.f.s.	INCHES	FT/FT	ELEV.	ELEV.	f.p.s.	f.p.s.	FT.	FT.	CON-STANT	FT.	FT.	ELEV.		ELEV.	ELEV.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		17	18

5.6.0 MANHOLES

Manholes provide a very important access point for maintenance purposes. Due to equipment restraints, every point within the storm drain must be a maximum of two hundred fifty (250) feet from an access point for drains thirty (30) inches in diameter or smaller. For storm drains greater than thirty (30) inches in diameter, manholes shall be placed so that there is a maximum distance of three hundred (300) feet to an access point. Inlets and storm drain outfalls may be considered as access points for maintenance purposes. Access points must be accessible in accordance with the requirements of Section 1.2.4D. of this Manual and must provide a maintenance path within the storm drain that has no more than one horizontal bend, with that bend having a deflection of no more than forty-five (45) degrees in the direction of the maintenance path, and no vertical bend with a deflection of greater than five (5) degrees. Storm drain slope adjustments of less than five (5) degrees are not subject to this requirement.

Manholes shall also be located where two or more laterals intersect the main line within five (5) feet of each other (See Figure 5-12 in Appendix B of this Manual for examples of possible manhole locations). Manholes shall also be placed at locations where changes in pipe size occur.

5.7.0 DEPTH OF COVER

The design of storm drains for areas that will or could receive vehicular traffic or that will be subject to other loading must be supported by structural engineering calculations or references to structural engineering standards.

SECTION 6 - OPEN CHANNELS

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SECTION 6 - OPEN CHANNELS

6.1.0 GENERAL

Open channels for use in a major drainage system have significant advantages related to cost, capacity, multiple use for recreational and aesthetic purposes and potential for detention storage. Disadvantages include right of way needs and maintenance costs. Careful planning and design are needed to minimize the disadvantages and to increase the benefits.

The general classifications for open channels are: (1) Natural channels, which include all watercourses that have been carved by nature through erosion; and (2) New or altered channels, which are constructed or existing channels that have been significantly altered by human effort. New or altered channels can be lined with grass, concrete, mortared rocks or other materials. The channels should be designed for the 25 year storm with provisions for the 100 year storm within dedicated easements or right of way.

6.1.1 Natural Channels

The ideal natural channel has the following benefits:

A. Velocities are usually low, resulting in longer concentration times and lower downstream peak flows.

B. Maintenance needs are usually low because the channel is somewhat stabilized.

C. The channel provides a desirable green belt and recreational area adding significant social benefits.

6.1.2 New or Altered Channels

Grass channels are the most desirable of the various types of new channels for the following reasons:

A. The grass can stabilize the body of the channel.

B. The grass consolidates the soil mass of the bed.

C. The grass controls the movement of soil particles along the channel bottom.

Concrete lined channels are designed to protect the channel body from the erosive potential of high velocities. In addition to concrete-lined channels, other methods to combat erosive velocities in channels may be available and should be submitted to the City Engineer for review.

6.1.3 Section 404 Permit

When a project to modify a natural channel is proposed, the design engineer should check the requirements of Section 404, Permits for Dredged or Fill Material, of the Clean Water Act. If required, a permit should be obtained from the U.S. Army Corps of Engineers by the design engineer.

6.2.0 OPEN CHANNEL HYDRAULICS

An open channel is a conduit in which water flows with a free surface. The classification of open channel flow is made according to the change in flow depth with respect to time and space.

Flow in an open channel is said to be "steady" if the depth of flow does not change or if it can be assumed to be constant during the time interval under consideration. The flow is "unsteady" if the depth changes with time.

Open channel flow is said to be "uniform" if the depth of flow is the same at every section of the channel. A uniform flow may theoretically be steady or unsteady, depending on whether or not the depth changes with time. The establishment of unsteady uniform flow requires that the water surface fluctuate with time while remaining parallel to the channel bottom. Since it is impossible for this condition to occur within a channel, steady uniform flow is the fundamental type of flow treated in open channel hydraulics.

Flow is "varied" if the depth of flow changes along the length of the channel. Varied flow may be either steady or unsteady. Since unsteady uniform flow is rare, the term "unsteady flow" is used to designate unsteady varied flow exclusively.

Varied flow may be further classified as either "rapidly" or "gradually" varied. The flow is rapidly varied if the depth changes abruptly over a comparatively short distance; otherwise, it is gradually varied. Rapidly varied flow is also known as a local phenomenon; an example of which is the hydraulic jump.

With these varying conditions, open channel hydraulics can be very complex, encompassing many different flow conditions from steady uniform flow to unsteady rapidly varied flow. Most of the problems in stormwater drainage involve uniform, gradually varied or rapidly varied flow situations. In this Section, the basic equation and computational procedures for uniform, gradually varied and rapidly varied flows are presented.

6.2.1 Uniform Flow

For a given channel condition of roughness, discharge and slope, there is only one (1) possible depth for maintaining a uniform flow. This depth is referred to as normal depth.

The Manning's Equation is used to determine the normal depth for a given discharge.

$$Q = (1.49/n)AR^{2/3}S^{1/2} \qquad \text{(Eq. 6-1)}$$

where,

- Q = Total discharge, cfs
- n = Roughness coefficient
- A = Cross-sectional area of channel, ft^2
- R = Hydraulic radius of channel, feet (R=A/P)
- S = Slope of the frictional gradient, ft/ft
- P = Wetted perimeter, feet

Uniform flow is more often a theoretical abstraction than an actuality. True uniform flow is difficult to find in nature or to obtain in the laboratory. The Engineer must be aware of the fact that uniform flow computations provide only an approximation of what will occur but that such computations are usually adequate and useful and, therefore, necessary for planning.

The computation of normal depth for trapezoidal sections can be performed by using Figure 6-1 in Appendix B of this Manual.

6.2.2 Gradually Varied Flow

The most common example of gradually varied flow in urban drainage systems occurs in the backwater of bridge openings, culverts, storm sewer inlets and channel constrictions. Under these conditions, gradually varied flow will be created and the flow depth will be greater than normal depth in the channel. Backwater techniques would need to be applied to determine the water surface profile.

Calculations of water surface profiles can be accomplished by using standard backwater methods or acceptable computer routines, which take into consideration all losses due to changes in velocity, drops, bridge openings and other obstructions in open channels.

There are several acceptable methods for backwater calculations. The most common hand calculation method for prismatic channels and irregular-uniform channels is the Standard Step Method. The most widely used backwater analysis computer program is HEC-2, developed by the U.S. Army Corps of Engineers. This program can compute water surface profiles for natural and new channels.

6.2.3 Rapidly Varied Flow

Rapidly varied flow is characterized by abrupt changes in the water surface elevation for a constant flow. The change in elevation may become so abrupt that the flow profile is virtually broken, resulting in a state of high turbulence. Some common causes of rapidly varied flow in urban drainage systems are side-spill weirs, weirs and spillways of detention basins.

6.3.0 MANNING'S ROUGHNESS COEFFICIENTS

6.3.1 Existing and Natural Channels

Because several primary factors affect the roughness coefficient, a procedure has been developed to estimate this value, n. By this procedure, the value of n may be computed by:

$$n = (n_0 + n_1 + n_2 + n_3 + n_4)m \qquad \text{(Eq. 6-2)}$$

where n_0 is a basic n value for a straight, uniform, smooth channel in the natural materials involved, n_1 is a value added to n_0 to correct for the effect of surface irregularities; n_2 is a value for variations in shape and size of the channel cross section; n_3 is a value for obstructions; n_4 is a value for vegetation and flow conditions; and m is a correction factor for meandering of the channel. Proper values of n_0 to n_4 and m may be selected from Table 6-1 according to the given conditions.

In selecting the value of n_1, the degree of irregularity is considered smooth for surfaces comparable to the best attainable for the materials involved; minor for good dredged channels, slightly eroded or scoured side slopes of canals or drainage channels; moderate for fair to poor dredged channels, moderately sloughed or eroded side slopes of canals or drainage channels; and severe for badly sloughed banks of natural streams, badly eroded or sloughed sides of canals or drainage channels, and unshaped, jagged and irregular surfaces of channels excavated in rock.

In selecting the value of n_2, the character of variations in size and shape of cross section is considered gradual when the change in size or shape occurs gradually; alternating occasionally when large and small sections alternate occasionally or when shape changes cause occasional shifting of main flow from side to side; and alternating frequently when large and small sections alternate frequently or when shape changes cause frequent shifting of main flow from side to side.

The selection of the value of n_3 is based on the presence and characteristics of obstructions such as debris deposits, stumps, exposed roots, boulders and fallen and lodged logs. One should recall that conditions considered in other steps must not be re-evaluated or double-counted in this selection. In judging the relative effect of obstructions, consider the following: the extent to which the obstructions occupy or reduce the average water area, the obstruction characteristics (sharp-edged or angular objects induce greater turbulence than curved, smooth-surfaced objects) and the position and spacing of obstructions transversely and longitudinally in the reach under consideration.

Table 6-1 **Computation of Composite Roughness Coefficient** **For Excavated and Natural Channels** **$n = (n_0 + n_1 + n_2 + n_3 + n_4)m$**		
Channel Conditions		Values
n_0 Material Involved	Earth React Fine Gravel Coarse Gravel	0.020 0.025 0.024 0.028
n_1 Degree of Irregularity	Smooth Minor Moderate Severe	0.000 0.005 0.010 0.020
n_2 Relative Effect of Channel Cross Section	Gradual Alternating Occasionally Alternating Frequently	0.000 0.005 0.013
n_3 Relative Effect of Obstructions	Negligible Minor Appreciable Severe	0.000 0.013 0.025 0.050
n_4 Vegetation	Low Medium High Very High	0.008 0.018 0.038 0.075
m Degree of Meandering	Minor Appreciable Severe	1.000 1.150 1.300
Source: Chow, V.T. Open Channel Hydraulics, 1959.		

In selecting the value of n_4, the degree of effect of vegetation is considered in the following way:

A. Low for conditions comparable to the following: (a) dense growths of flexible turf grasses or weeds, of which Bermuda and blue grasses are examples, where the average depth of flow is two (2) to three (3) times the height of vegetation; and (b) supple seedling tree switches, such as willow, cottonwood or salt cedar where the average depth of flow is three (3) to four (4) times the height of the vegetation.

B. Medium for conditions comparable to the following: (a) turf grasses where the average depth of flow is one (1) to two (2) times the height of vegetation; and (b) stemmy grasses, weeds or tree seedlings with moderate cover where the average depth of flow is two (2) to three (3) times the height of vegetation and brush growths, moderately dense, similar to willows one (1) to two (2) years old, dormant season, along side slopes of a channel with no significant vegetation along the channel bottom, where the hydraulic radius is greater than two (2) feet.

C. High for conditions comparable to the following: (a) turf grasses where the average depth of flow is about equal to the height of vegetation, (b) dormant season – willow or cottonwood trees eight (8) to ten (10) years old, intergrown with some weeds and brush, where none of the vegetation is in foliage, where the hydraulic radius is greater than two (2) feet; and (c) growing season -- bushy willows about one (1) year old intergrown with some weeds in full foliage along side slopes, no significant vegetation along channel bottom, where hydraulic radius is greater than two (2) feet.

D. Very high for conditions comparable to the following: (a) turf grasses where the average depth of flow is less than half (1/2) the height of vegetation, (b) growing season -- bushy willows about 1 year old, intergrown with weeds in full foliage along side slopes, or dense growth of cattails along channel bottom, with any value of hydraulic radius up to ten (10) or fifteen (15) feet and (c) growing season-trees intergrown with weeds and brush, all in full foliage, with any value of hydraulic radius up to ten (10) or fifteen (15) feet.

In selecting the value of m, the degree of meandering depends on the ratio of the meander length to the straight length of the channel reach. The meandering is considered minor for ratios of one (1.0) to one and two tenths (1.2), appreciable for ratios of one and two tenths (1.2) to one and five tenths (1.5), and severe for ratios of one and five tenths (1.5) and greater.

In applying the above method for determining the n value, several things should be noted. The method does not consider the effect of suspended and bed loads. The values given in Table 6-2 were developed from a study of some forty (40) to fifty (50) cases of small and moderate channels. Therefore, the method is questionable when applied to large channels whose hydraulic radii exceed fifteen (15) feet. The method applies only to unlined natural streams, floodways, and drainage channels and shows a minimum value of 0.02 for the n value of such channels. The minimum value of n in general, however, may be as low as 0.012 in lined channels and as low as 0.008 in artificial laboratory flumes.

6.3.2 New or Altered Channels

The Manning's Roughness Coefficients (n) for new or altered channels are shown in Table 6-2.

6.4.0 DESIGN REQUIREMENTS

Channel design involves the determination of the channel cross-section required to accommodate a given design discharge. The design requirements for open channels are discussed in the sections below and apply to channels or waterways that are proposed to be modified or constructed.

6.4.1 Grass-Lined Channels and Waterways

Key parameters in grass-lined channel or waterway design include permissible velocity, roughness coefficient, side slope, curvature, bottom width, and freeboard. The grass species selected shall be suitable for permanent application based upon the anticipated operation and maintenance of the channel or waterway.

A. **Velocity.** The maximum permissible velocity for the 100 year storm is six (6) feet per second and includes all transitions to or from channels and waterways with similar or different materials. In all cases, the velocity for the 100 year storm must be non-erosive. The minimum permissible velocity for the 2 year storm is two (2) feet per second.

B. **Roughness Coefficient.** The roughness coefficients selected shall be based on the degree of retardance of vegetation. Table 6-2 provides minimum Manning's Coefficients for channel design. The roughness coefficient shall be adjusted to reflect the relationship between the depth of flow and the typical height of the design vegetation, especially for shallow depths of flow, as well as other factors affecting channel conveyance.

C. **Slope.** The flow line slope of the channel shall be a minimum of two (2) percent unless the velocity for the 2 year storm flow is greater than two (2) feet per second, in which case the channel slope may be a minimum of one (1) percent. Compliance with this requirement must take into account the variation in channel flow due to distributed inflows to the channel. A reinforced concrete pilot channel must be used if the channel slope is less than one (1) percent. The pilot channel must be at least four (4) feet wide, two (2) inches deep, and be capable of withstanding vehicular loading. Any grass-lined portion of the channel bottom must have a slope of at least two (2) percent from that portion to the concrete-lined pilot channel. However, no open channel flow line slope may be less than one-half (0.5) percent.

D. **Side Slopes.** Side slopes shall be four (4) to one (1) or flatter for channels equal to or over four (4) feet deep and three (3) to one (1) or flatter for channels less than four (4) feet deep.

E. **Curvature.** The center line curvature shall have a minimum radius of twice the top width of the 100 year storm flow.

F. **Bottom Width.** The minimum flat bottom width of the channel is three (3) feet.

G. Freeboard. All grass-lined channels shall be designed to convey the one hundred (100) year storm event. The freeboard for the channel shall be the velocity head for the one hundred (100) year storm.

6.4.2 Concrete-Lined Channels

Concrete-lined channels may be needed in channel reaches where the velocities are excessive (See Section 6.4.1A. of this Manual) or where the channel characteristics require such use.

A. **Velocity.** In concrete-lined channels the probability of achieving supercritical flow is greatly increased. The designer must take care to insure against the possibility of unanticipated hydraulic jumps forming in the channel in considering the 25 and 100 year storms. Flow with a Froude number equal to one (1) is unstable and should be avoided. If supercritical flow does occur, then freeboard and superelevation must be determined. In addition, all channels carrying supercritical flow shall be continuously lined with reinforced concrete.

B. **Roughness Coefficient.** Table 6-2 provides the Manning's Coefficients for concrete-lined channels.

C. **Freeboard.** Adequate channel freeboard shall be provided for the 100 year storm in reaches flowing at critical depth by Equation 6-3 or using the energy grade line, whichever is less.

$$H_{FB} = 2.0 + 0.025V\,(d)^{1/3} \qquad \text{(Eq. 6-3)}$$

where,

H_{FB} = Freeboard height, ft
V = Velocity, ft/sec
d = Depth of flow, ft

Freeboard shall be in addition to superelevation, standing waves and/or other water surface disturbances. Concrete sideslopes shall be extended to provide freeboard. Freeboard shall not be obtained by the construction of levees.

D. **Superelevation.** Superelevation of the water surface shall be determined at all horizontal curves which deviate more than forty-five (45) degrees off the projected centerline. An approximation of the superelevation at a channel bend can be obtained from the following equation:

$$h = V_2 T_w / g r_c \qquad \text{(Eq. 6-4)}$$

where

h = Superelevation, ft
V = Flow velocity, ft/sec
T_w = Top width of channel, ft
r_c = Centerline radius of curvature, ft
g = Acceleration due to gravity, ft/sec^2

The freeboard shall be measured above the superelevation water surface.

E. **Side Slopes.** Since concrete lined channels do not require slope maintenance, the side slopes may be as steep as vertical with appropriate structural methods applied.

F. **Slope.** The flow line slope of the channel shall be no less than five tenths (0.5) percent and must also be sufficient to produce a velocity for the two (2) year storm flow of at least two (2) feet per second. Compliance with this requirement must take into account the variation in channel flow due to distributed inflows to the channel.

6.4.3 OTHER CHANNELS

Channels composed of materials other than vegetation or concrete shall be designed so that sediment deposition does not occur for the 2 year storm (except for channel drop structures and energy dissipators as approved by the City) and velocities for the 100 year storm are not erosive, using methods as approved by the City Engineer.

6.5.0 CHANNEL DROP STRUCTURES

The function of a drop structure is to reduce channel velocities by allowing for flatter upstream and downstream channel slopes. Two commonly used drop structures are shown in Figure 6-2 in Appendix B of this Manual.

The flow velocities in the upstream and downstream channels of the drop structure need to satisfy the permissible velocities allowed for channels. The design parameters for the sloping channel drop and the vertical channel drop are given below.

6.5.1 Sloping Channel Drop

A. **Approach Apron.** A minimum ten (10) foot long riprap apron should be constructed immediately upstream of the drop to protect against the increasing velocities and turbulence which result as the water approaches the sloping portion of the drop structure. The same riprap and bedding design should be used as specified for the portion of the drop structure immediately downstream of the drop.

B. **Chute.** The chute shall have roughened faces and shall be no steeper than 2:1.The length, L, of the chute depends upon the hydraulic characteristics of the channel and drop. For a unit discharge, q, of thirty (30) cubic feet per second per foot, L would be about fifteen (15) feet, that is, about one-half (1/2) of the q value. The L should not be less than ten (10) feet, even for low q values.

C. **Downstream Apron.** The length of the downstream apron shall be sized according to Table 6-3 and shall be constructed of reinforced concrete or riprap depending on structural requirements.

Table 6-2 Minimum Roughness Coefficients of New or Altered Channels	
Type of Channel and Description	Manning's Coefficients
1. Grass lined a. Bermuda (with regular mowing) b. St. Augustine (with regular mowing) c. Native grasses and vegetation not	 .040 .045 .060
2. Concrete a. Concrete lined (rough finish) b. Concrete lined (smooth finish-culverts) c. Concrete rip-rap (exposed rubble)	 .020 .015 .025
3. Gabion	.035
4. Rock-cut	.025
Source: 1. Chow, V.T. Open Channel Hydraulics. 1959. 2. WRC Engineering, Inc. Boulder County Storm Drainage Criteria Manual. 1984.	

Table 6-3 Length of Downstream Apron	
Maximum Unit Discharge, q (cfs/ft)	Length of Downstream Apron, L_B (ft)
0-14	10
15	15
20	20
25	20
30	25
Source: City of Austin, Watershed Engineering Division.	

6.5.2 Vertical Channel Drops

The design criteria for the vertical channel drop is based upon the height of the drop and the normal depth and velocity of the approach and exit channels. The channel must be prismatic throughout, from the upstream channel through the drop to the downstream channel.

The steepest allowable sideslope for the riprap stilling basin is 4:1. The riprap should extend up the side slopes to a depth equal to one (1) foot above the normal depth projected upstream from the downstream channel. The maximum fall allowed at any one drop structure is four (4) feet from the upper channel bottom to the lower channel bottom.

A description of the drop structure and the design procedure, going from upstream to downstream, is given below and shown on Figure 6-2 in Appendix B of this Manual.

A. Approach Channel: The upstream and downstream channels will normally be grass-lined trapezoidal channels.

B. Approach Apron: A minimum ten (10) foot long riprap apron is provided upstream of the drop to protect against the increasing velocities and turbulence which result as the water approaches the vertical drop.

C. Chute Apron: The riprap stilling basin is designed to force the hydraulic jump to occur within the basin and is designed for essentially zero scour.

6.6.0 ENERGY DISSIPATORS

Energy dissipators are used to dissipate excessive kinetic energy in flowing water that could promote erosion. An effective energy dissipator must be able to retard the flow of fast moving water without damage to the structure or to the channel below the structure.

Impact-type energy dissipators direct the water into an obstruction that diverts the flow in many directions and in this manner dissipates the energy in the flow. Baffled outlets and baffled aprons are two (2) impact-type energy dissipators.

Other energy dissipators use the hydraulic jump to dissipate the excess head. In this type of structure, water flowing at a higher than critical velocity is forced into a hydraulic jump, and energy is dissipated in the resulting turbulence. Stilling basins are this type of dissipator, where energy is diffused as flow plunges into a pool of water.

Generally, the impact-type of energy dissipator is considered to be more efficient than the hydraulic jump-type. Also the impact-type energy dissipator results in smaller and more economical structures.

The design of energy dissipators is based on the empirical data resulting from a comprehensive series of model structure studies by the U.S. Bureau of Reclamation, as detailed in its book Hydraulic Design of Stilling Basins and Energy Dissipators, 1984. Two (2) impact-type energy dissipators are briefly explained here.

6.6.1 Baffled Apron (U.S. Bureau of Reclamation Type IX)

Baffled aprons are used to dissipate the energy in the flow at a drop. They require no initial tailwater to be effective, although channel bed scour is not as deep and is less extensive when the tailwater forms a pool into which the flow discharges. The chutes are constructed on a slope that is 2:1 or flatter and extends below the channel bottom. Backfill is placed over one (1) or more bottom rows of baffles to restore the original streambed elevation. When scour or downstream channel degradation occurs, successive rows of baffle piers are exposed to prevent excessive acceleration of the flow entering the channel. If degradation does not occur, the scour creates a stilling pool at the downstream end of the chute, stabilizing the scour pattern. The simplified hydraulic design of the baffled apron is shown in Figure 6-3 in Appendix B of this Manual.

The general rules of hydraulic design of a baffled apron are as follows:

A. **Design Discharge.** The chute should be designed for the full capacity expected to be passed through the structure. The maximum unit discharge may be as high as sixty (60) cfs per foot for the 100 year storm.

B. **Chute Entrance.** The flow entering into the chute should be well distributed laterally across the width of the chute. The velocity should be well below the critical velocity, preferably the value shown in the curve D of Figure 6-3 in Appendix B of this Manual. The curve C in Figure 6-3 in Appendix B of this Manual is the critical velocity in a rectangular channel, $V_c=(gq)^{1/3}$.

C. **Chute Design.** The chute is usually constructed on a 2:1 slope. The upstream end of the chute floor should be joined to the horizontal floor by a curve to prevent excessive vertical contraction of the flow. The upstream face of the first row should be no more than one (1) foot (vertically) below the high point of the chute.

Based on the results of U.S. Bureau of Reclamation experiments, the greatest tendency to overtop the training walls occurs in the vicinity of the second and third rows of baffles. To prevent this overtopping, a partial baffle (1/3 to 2/3 of the width of a full baffle) should be placed against the training walls in the first row. This will place a space of the same width adjacent to the walls in the second row. Alternate rows are then made identical (i.e., rows 1, 3, 5, 7, etc., are identical; rows 2, 4, 6, 8, etc., are identical). Four (4) rows of baffles are necessary to establish the expected flow pattern at the base of the chute.

The height of the training walls on the chute should be three (3) or more times the baffle height, measured normal to the chute floor. Several rows of baffle piers are usually constructed below the channel grade to establish full control of the flow. At least one (1) row of baffles should be buried in the backfill which is used to restore the original bottom topography.

D. Heights and Spacing of Baffle Pier. Baffle pier height, H, should be about eight tenths (0.8) D_c to nine tenths (0.9) D_c, as shown in Curve B in Figure 6-3 in Appendix B of this Manual. D_c is the critical depth in a rectangular channel and determined by:

$$D_c=(q^2/g)^{1/3} \qquad \text{(Eq.6-5)}$$

Baffle pier widths and spaces should be equal, up to 1.5 H but no less than H. The slope distance between rows of baffle piers should be 2H, twice the baffle height.

6.6.2 Baffled Outlet

Baffled outlets are used to dissipate the discharge energy from flow in a pipe. They are normally used at outlets from detention ponds or storm drainage systems. The baffles are intended to decrease the discharge velocities and subsequent erosion of the receiving system.

6.7.0 STRUCTURE AESTHETICS

The design of hydraulic structures in the urban environment requires an approach not encountered elsewhere because appearance must be an integral part of the design. The treatment of the exterior appearance should not be considered of minor importance.

Parks. Hydraulic structures should not detract from the pleasures enjoyed in an urban park. Furthermore, parks and green belts may later be developed in an urban area in which the structure will play a dominant environmental role.

Play Areas. An important consideration is that drainage structures often are an attraction for neighborhood children. It is almost impossible to make drainage works inaccessible to children, and therefore what is constructed should be made as safe as is reasonably possible. Hazards to children's safety should be avoided whenever possible.

Concrete Surface Treatment. The use of textured concrete presents a pleasing appearance and removes form marks. Exposed aggregate concrete is also attractive but may require special control of the aggregate used in the concrete.

Rails and Fences. The use of rails and fences along concrete walls provides a pleasing topping to an otherwise stark wall, yet provides a safety measure against the hazard of falling from an unprotected wall.

6.8.0 SUPPLEMENTAL SECTION

6.8.1 Alternative New Channel Design

The following is a description of the cross-sectional characteristics of an alternative channel design to be applied at the engineer's discretion but is in no way a requirement.

A. A pilot channel designed to carry the 10 year storm shall be calculated with Manning's "n" values in accordance with Tables 6-2 and 6-3. This channel is designed to separate the more frequent 10 year storm via an unobstructed pilot channel. Side slopes of the pilot channel shall not exceed 3:1 slope gradient and shall have a bottom width of no less than six (6) feet. The remaining cross-sectional area is designed to convey the additional storm flows up to the 100 year storm. This upper platform will accommodate vegetation with minimal maintenance requirements.

B. The ultimate 100 year floodplain shall be contained within overbanks on each side of the pilot channel. These overbanks shall be a minimum width often (10) feet and have a slope gradient not to exceed 6:1. The overbanks shall be stabilized with the seeds of grasses, native wildflowers and native woody species appropriate to riparian habitat and with blanket products. In calculating Manning's "n" values for the overbanks, reference must be made to Tables 6-2 and 6-3 with the following assumptions:

1. Heavily wooded and brushy overbanks; and
2. Bank irregularities, which can be reasonably expected from occasional, moderate erosion.

Figure 6-4 in Appendix B of this Manual depicts the conceptual idea of the alternative channel design.

SECTION 7 - CULVERTS

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SECTION 7 - CULVERTS

7.1.0 GENERAL

The function of a drainage culvert is to pass the design storm flow without causing excessive backwater or overtopping of the structure and without creating excessive downstream velocities. The designer shall keep energy losses and discharge velocities within allowable limits when selecting a structure that will meet these requirements. The design storm flow shall be determined by the hydrologic methods as set forth in Section 2 of this Manual. The system shall accommodate the runoff from a 100 year frequency storm meeting the limitations for overflows at bridges and culverts set forth in Sections 1.2.4C. and 1.2.4D. of this Manual.

7.2.0 CULVERT HEADWALLS

7.2.1 General

The normal functions of properly designed headwalls and endwalls are to anchor the culvert in order to prevent movement due to hydraulic and soil pressures, to control erosion and scour resulting from excessive velocities and turbulence and to prevent adjacent soil from sloughing into the waterway opening. All headwalls shall be constructed of reinforced concrete and may be either straight-parallel, flared or warped. They may or may not require aprons, as determined by site conditions. Headwalls should be aligned with the direction of the receiving flow when discharging into a waterway. Precast headwalls and endwalls may be used if all other criteria are satisfied; generally precast headwalls/endwalls are available for smaller culverts eighteen (18) and twenty-four (24) inches diameter.

7.2.2 Conditions at Entrance

The operating characteristics of a culvert may be completely changed by the shape or condition at the inlet or entrance. Therefore, design of culverts must involve consideration of energy head losses that may occur at the entrance. Entrance head losses may be determined by the following equation:

$$h_e = K_e(V_2^2 - V_1^2)/2g \qquad \text{(Eq.7-1)}$$

where,

h_e = Entrance head loss, feet
V_2 = Velocity of flow in culvert, ft/sec
V_1 = Velocity of flow approaching culvert, ft/sec
K_e = Entrance loss coefficient as shown in Table 7-1
g = Acceleration due to gravity

7.2.3 Type Of Headwall

The common types of headwall entrances are shown in Figure 7-1 in Appendix B of this Manual, but are not limited to the designs shown there. The following guidelines can be used in the selection of the type of headwall. Approach velocities are measured immediately upstream of the headwall under normal operating conditions.

Table 7-1
Values of Culvert Entrance Loss Coefficients

Type of Entrance	Entrance Coefficient, K_e
Pipe	
Headwall (no wingwalls)	
Grooved edge	0.20
Rounded edge (0.15D radius)	0.15
Rounded edge (0.25D radius)	0.10
Square edge (cut concrete and CMP)	0.40
Headwall with 45° Wingwalls	
Grooved edge	0.20
Square edge	0.35
Headwall with Parallel Wingwalls Spaced 1.25D apart	0.30
Grooved edge	0.40
Square edge	0.25
Projecting Entrance (no headwall or wingwalls)	0.25
Grooved edge (RCP)	0.50
Square edge (RCP)	0.90
Sharp edge, thin walls (CMP)	
Sloping Entrance (no headwall or wingwalls)	
Mitered to conform to slope	0.70
Flared-end section	0.50

Table 7-1 (Continued) Values of Culvert Entrance Loss Coefficients	
Type of Entrance	Entrance Coefficient, K_e
Box, Reinforced Concrete	
Headwall Parallel to Embankment (no wingwalls) Square edge on sides of opening Rounded on 3 edges to radius of 1/12 barrel dimension	 0.50 0.20
Wingwalls at 30° to 75° to barrel axis Square edged at crown Crown edge rounded to radius of 1/12 barrel dimension	 0.40 0.20
Wingwalls at 10° to 30° to barrel Square edged at crown	 0.50
Wingwalls parallel (extension of culvert walls) Square edged at crown	 0.70
RCP: Reinforced Concrete Pipe CMP: Corrugated Metal Pipe NOTE: The entrance loss coefficients are used to evaluate the culvert or sewer capacity operating under outlet control.	
Source: WRC Engineering, Inc. Boulder County Storm Drainage Criteria Manual, 1984	

A. Parallel Headwall.

1. Approach velocities are low (below six (6) feet per second).
2. Backwater pools are permitted.

B. Flared Headwall.

1. Approach velocities are between six (6) and ten (10) feet per second.
2. Ample right of way or easement is available.

The wings of flared walls should be located with respect to the direction of the approaching flow, not the culvert axis as in Figure 7-1 in Appendix B of this Manual.

C. Warped Headwall.

Approach velocities are between eight (8) and twenty (20) feet per second. Warped headwalls are effective with aprons to accelerate flow through the culvert.

7.2.4 Debris Fins.

For conditions where more than one (1) box culvert is required, the upstream face of the structure shall incorporate debris deflector fins to prevent debris buildup. For multiple-pipe situations installations of debris fins may be used but are not required.

The debris fin is an extension of the interior walls of a multiple-box culvert. The wall thickness shall be designed to satisfy structural requirements and reduce impact and turbulence to the flow.

A debris fin is constructed to the height of the culvert. A fin length of one and five tenths (1.5) times the height of the box culvert is required. Since the debris fins are subject to the same erosive forces as bridge piers, care must be taken in the design of the footing. A toewall at the upstream end of the debris fin and the apron is recommended. Figure 7-2 in Appendix B of this Manual depicts the conceptual design for debris deflector fins. It should be noted that alternate types of wingwalls can be used other than the parallel shown in Figure 7-2 in Appendix B of this Manual.

7.3.0 CULVERT DISCHARGE VELOCITIES

High discharge velocities from culverts can cause eddies or other turbulence which could damage unprotected downstream properties and roadway embankments. To prevent damage from scour and erosion in these conditions, culvert outlet protection is needed. This outlet protection is based on the discharge velocity.

Velocity	Outlet Protection
Below six (6) ft/sec	Riprap protection. (Four (4) inch minimum thickness) or alternate approved material.
Above six (6) ft/sec	Structurally reinforced apron, six (6) inch minimum thickness with toe wall.

The minimum apron length which provides transition from a culvert outlet to an open channel shall be calculated from the following equation:

$$L = 0.2VD \qquad \text{(Eq. 7-2)}$$

where,

L = Apron length, feet
V = culvert discharge velocity, ft/sec
D = height of box culvert or diameter of pipe culvert, feet

7.4.0 SELECTION OF CULVERT SIZE AND FLOW CLASSIFICATION

Laboratory tests and field observations show that there are two (2) major types of culvert flow: (1) flow with inlet control; and (2) flow with outlet control. Under inlet control, the cross-sectional area of the barrel, the inlet configuration or geometry and the amount of headwater are the factors affecting capacity. Outlet control involves the additional consideration of the tailwater in the outlet channel and the slope, roughness and length of barrel. Under inlet control conditions, the slope of the culvert is steep enough so that the culvert does not flow full and the tailwater does not affect the flow.

7.4.1 Culvert Hydraulics

A. Inlet Control Condition.

Inlet control for culverts may occur in two (2) ways.

1. Unsubmerged: The headwater is not sufficient to submerge the top of the culvert opening and the culvert inlet slope is supercritical. The culvert inlet acts like a weir (Condition A, Figure 7-3 in Appendix B of this Manual).

2. Submerged: The headwater submerges the top of the culvert but the pipe does not flow full. The culvert inlet acts like an orifice (Condition B, Figure 7-3 in Appendix B of this Manual).

The discharge capacity for several culvert materials, shapes, and inlet configurations under inlet control conditions are presented in Figures 7-5 to 7-1D in Appendix B of this Manual. These nomographs were developed empirically by the Bureau of Public Roads, the Federal Highway Administration and various pipe manufacturers. The nomographs are recommended for use in all inlet-control culvert calculations.

B. **Outlet Control Condition.**

There are three (3) types of outlet control culvert flow conditions:

1. The headwater submerges the culvert opening, and the culvert outlet is submerged by the tailwater. The culvert will flow full (Condition A, Figure 7-3 in Appendix B of this Manual).

2. The headwater submerges the culvert opening, the culvert outlet is not submerged by the tailwater (Condition B or C, Figure 7-3 in Appendix B of this Manual).

3. The headwater is insufficient to submerge the top of the culvert opening. The culvert slope is subcritical and the tailwater depth is lower than critical depth for the culvert (Condition D, Figure 7-3 in Appendix B of this Manual).

The capacity of a culvert for outlet control is calculated using Bernoulli's Equation, which is based on the conservation of energy principle. In the application of this equation, an energy balance is determined between the headwater at the culvert inlet and the tailwater at the culvert outlet. This balance is a function of inlet losses, friction losses and velocity head (See Figure 7-4 in Appendix B of this Manual).

Bernoulli's Equation is:

$$d_1 + V_1^2/2g + LS_0 = TW + h_e + h_f + h_v \qquad \text{(Eq. 7-3)}$$

The sum of the first two (2) terms on the left-hand side of Equation 7-3 is equal to the headwater (HW). That is:

$$HW = d_1 + V_1^2/2g \qquad \text{(Eq. 7-4)}$$

Substituting Equation 7-4 into Equation 7-3 and isolating the head losses on the right

side results in the following equation:

$$HW + LS_0 - TW = h_e + h_f + h_v \qquad \text{(Eq. 7-5)}$$

From Figure 7-4 (in Appendix B of this Manual),

$$HW + LS_0 = H_L + TW$$

Thus the total head loss can be determined from this relationship as shown in Equation 7-6:

$$HL = HW + LS_0 \quad TW \qquad \text{(Eq.7-6)}$$

Substituting Equation 7-6 into Equation 7-5, the following results:

$$H_L = h_e + h_f + h_v \qquad \text{(Eq. 7-7)}$$

in which $h_v = V^2/2g.$ (Eq. 7-8)

For inlet losses, the governing equation is Equation 7-1:

$$h_e = K_e(V_2^2 - V_1^2)/2g$$

From Equation 7-4, the headwater (HW) is above the actual depth by the velocity head of the approaching water. However, with water ponded at the entrance, this velocity head (V_1) is usually considered to be negligible, therefore,

$$h_e = K_e V^2/2g \qquad \text{(Eq. 7-9)}$$

where K_e is the entrance loss coefficient, as shown in Table 7-1 and V is the velocity of flow in the culvert.

Friction loss is the energy required to overcome the roughness of the culvert material and is expressed as:

$$hf = (29n^2L/R^{1.33})(V^2/2g) \qquad \text{(Eq. 7-10)}$$

where n = Manning's coefficient
L = Length of culvert, feet
R = Hydraulic radius, feet
V = Velocity of flow in the culvert, ft/sec

Combining Equations 7-7, 7-8, 7-9 and 7-10 and simplifying the terms results in the following equation:

$$H = (K_e + 1 + 29n^2L/R^{1.33})V^2/2g \qquad \text{(Eq. 7-11)}$$

Equation 7-11 can be used to calculate directly the capacity of the culvert flowing under outlet condition A or B in Figure 7-3 in Appendix B of this Manual. This is because conditions A and B have tailwater depths at or above the top of the culvert and conditions C and D have tailwater depths which are less than critical depth. The method for calculating headwater depth for conditions C and D is discussed in the following section.

C. Depths of Tailwater and Headwater.

In culverts flowing with outlet control, tailwater is an important factor in computing both the headwater depth and the hydraulic capacity of a culvert. Thus, in many culvert designs, it becomes necessary to determine tailwater depth in the outlet channel.

Much engineering judgment and experience are needed to evaluate possible tailwater conditions during storms. A field inspection should be made to check on downstream controls and to determine water stages. Tailwater is often controlled by a downstream obstruction or by water stages in another stream.

An approximation of the depth of flow in a natural stream (outlet channel) can be made by using Manning's equation in the channel with normal flow condition (see Section 6.2.1, Uniform Flow of this Manual). If the water surface in the outlet channel is established by downstream controls, a backwater analysis is required (see Section 6.2.2, Gradually Varied Flow of this Manual).

The headwater depth can be calculated by the summation of head loss, tailwater depth and the elevation difference of the inlet and outlet, as shown in the following equation:

$$HW = H + h_0 \quad LS_0 \qquad \text{(Eq.7-12)}$$

where,

HW = vertical distance from flow line at the entrance to the pool surface, feet

H = head loss, feet (use appropriate nomograph)

h_0 = vertical distance from flow line at the outlet to the hydraulic grade line, feet (In this case h_0 equals TW, measured in feet above the flow line.)

S_0 = slope of barrel, ft/ft

L = culvert length, feet

Equation 7-12 has the same form shown in Equation 7-6, which was derived from Bernoulli's Equation. For a tailwater depth equal to or greater than the top of the culvert at the outlet (outlet control conditions A and B in Figure 7-3 in Appendix B of this Manual), h_0 can be set equal to TW and the headwater depth can be found by Equation 7-12. For tailwater elevation less than the top of the culvert at the outlet (outlet control conditions C and D in Figure 7-3 in Appendix B of this Manual), h_0 in Equation 7-12 will be assumed as

$$h_0=(d_c+D)/2 \text{ or } TW, \qquad \text{(Eq. 7-13)}$$

where,

d_c = critical depth in feet (d_c cannot exceed D)

D = height of culvert opening in feet whichever value is greater.

Headwater depth determined by Equations 7-12 and 7-13 becomes increasingly less accurate as the headwater computed by this method falls below the value of $D + (1+K_e)V^2/2g$.

A series of nomographs for various culvert materials and shapes have been developed by the Federal Highway Administration and the various pipe manufacturers. The nomographs presented herein include inlet control conditions (Figures 7-5 to 7-10 in Appendix B of this Manual) and outlet control conditions (Figures 7-11 to 7-17 in Appendix B of this Manual). The critical depth for pipes of different shapes are shown in Figures 7-16 to 7-22 in Appendix B of this Manual.

7.4.2 Design Procedures

The State Highway Department's THYSYS program can be used for culvert design in addition to help calculate the culvert size and related computations. Design procedures are as follows:

A. Step 1. List design data.

1. Design discharge Q, cfs
2. Approximate length L of culvert, feet
3. Slope of culvert, ft/ft
4. Allowable headwater depth, which is the vertical distance from the culvert invert (flow line) at the entrance to the water surface elevation permissible in the headwater pool or approach channel upstream from the culvert, feet
5. Allowable flow velocities in natural stream
6. Type of culvert for first trial selection, including material, cross-sectional shape and entrance type.

B. Step 2. Determine the first trial size culvert.

Since the procedure given is one of trial and error, the initial trial size can be determined by one of the following ways:

1. Make an arbitrary selection.
2. Use an approximating equation such as Q/V = A assuming a V for the trial culvert.
3. Use inlet control nomographs for the culvert type selected (Figures 7-5 to 7-10 in Appendix B of this Manual). If this method is used, an HW/D must be assumed. If any trial size is too large because of height restrictions or structure availability, multiple culverts may be used by dividing the discharge equally between the number of barrels used.

C. Step 3. Find headwater depth for trial size culvert assuming inlet control or outlet control.

1. Assuming Inlet Control

a. Using the trial size from Step 2 above, find the headwater depth HW by use f the appropriate inlet control nomograph (Figures 7-5 to 7-10 in Appendix B of this

manual). HW in this case is found by multiplying HW/D obtained from the nomograph by the height of the culvert (D). Tailwater (TW) conditions are neglected in this determination.

b. If HW is greater or less than the desired results, try another size until HW is acceptable for inlet control before computing HW for outlet control.

2. Assuming Outlet Control

a. Determine the depth of tailwater (TW), in feet, for the design flood condition at the outlet.

b. For a TW elevation equal to or greater than the outlet soffit of the culvert, set ho equal to the TW and find HW by Equation 7-12.

c. For a tailwater elevation less than the outlet soffit of the culvert, find headwater HW by Equation 7-12 and Equation 7-13.

3. Compare the headwaters found in Step 3-1 and Step 3-2 above (Inlet Control and Outlet Control). The higher headwater governs and indicates the type of flow control for the given conditions and culvert size selected.

D. Step 4. If outlet control governs but the HW is too high select a larger culvert size and recalculate HW as instructed in Step 3-2 above. If the previously calculated inlet control governs, the smaller size is satisfactory as determined under Step 3-1 above.

E. Step 5. Compute the outlet velocity for the size selected and determine its compatibility with the criteria of Section 7.3.0 of this Manual. If the computed velocity is too high, go back to Step 2 above and select a larger culvert size.

1. If outlet control governs in Step 3-3 above, the outlet velocity equals Q/A_0, where A_0 is the cross-sectional area of flow in the culvert at the outlet. If d_c or TW is less than the height of the culvert barrel, use A_0 corresponding to d_c or TW depth, whichever gives the greater area of flow. A_0 should not exceed the total cross- sectional area A of the culvert barrel.

2. If inlet control governs in Step 3-3 above, outlet velocity can be assumed to equal mean velocity in open-channel flow in the barrel as computed by Manning's Equation for the rate of flow, barrel size, roughness and slope of culvert selected.

F. Step 6. Record final selection of culvert with size, type, required headwater and outlet velocity.

7.4.3 Instructions For Using Nomographs

A. Inlet-Control Nomographs (Figures 7-5 to 7-10 in Appendix B of this Manual).

1. To determine HW, given Q, and size and type of culvert:

   a. Connect with a straightedge the given culvert diameter or height (D) and the discharge Q, or Q/B for box culverts; mark intersection of straightedge

on HW/D scale marked (1).

b. If HW/D scale marked (1) represents entrance type used, read HW/D on scale (1). If another of the three entrance types listed on the nomograph is used, extend the point of intersection in (a) horizontally to scale (2) or (3) and read HW/D.

c. Compute HW by multiplying HW/D by D.

2. To determine discharge (Q) per barrel, given HW, and size and type of culvert.

a. Compute HW/D for given conditions.

b. Locate HW/D on scale for appropriate entrance type. If scale (2) or (3) are used, extend HW/D point horizontally to scale (1).

c. Connect point on HW/D scale (1) as found in paragraph 2.(b) above and the size of culvert on the left scale. Read Q or Q/B on the discharge scale.

d. If Q/B is read in (c) multiply by B (span of box culvert) to find Q.

3. To determine culvert size, given Q, allowable HW and type culvert.

a. Using a trial size, compute HW/D.

b. Locate HW/D on scale for appropriate entrance type. If scale (2) or (3) is used, extend HW/D point horizontally to scale (1).

c. Connect point on HW/D scale (1) as found in paragraph 3.(b) above to given discharge and read diameter, height or size of culvert required for HW/D value.

d. If D is not that originally assumed, repeat procedure with a new D.

B. Outlet-Control Nomographs (<u>Figures 7-11 to 7-17</u> in Appendix B of this Manual).

Outlet control nomographs can be used to solve Equation 7-11 for head H when the culvert barrel flows full for its entire length. They are also used to determine H for some part-full flow conditions with outlet control. These nomographs do not give a complete solution for HW, since they give only H in the equation $HW = H + h_0 - LS_0$.

1. To determine H for a given culvert and discharge Q:

a. Select appropriate nomograph for type of culvert selected. Find K_e for entrance type from Table 7-1.

b. Begin nomograph solution by locating.starting point on length scale. To locate the proper starting point on the length scales, follow the three (3) steps provided below.

Step 1. If the n value of the nomograph corresponds to that of the culvert being used, select the length curve for the proper K_e and locate the starting point at the given culvert length. If a K_e curve is not shown for the selected K_e, see Step 2 below. If the n value for the culvert selected differs from that of the nomograph, see Step 3 below.

Step 2. For then of the nomograph and a K_e intermediate between the scales given, connect the given length on adjacent scales by a straight line and select a point on this line spaced between the two (2) chart scales in proportion to the K_e values.

Step 3. For a different roughness coefficient n1 than that of the chart n, use the length scales shown with an adjusted length L_1, calculated by the following equation:

$$L_1=L(n_1/n)^2 \qquad \text{(Eq. 7-14)}$$

c. Using a straightedge, connect point on length scale to size of culvert barrel and mark the point of crossing on the "turning line." See subsection 7.4.3A.2. below for size considerations for rectangular box culvert.

d. Pivot the straightedge on this point on the turning line and connect given discharge rate. Read head in feet on the head (H) scale. For values beyond the limit of the chart scales, find H by solving Equation 7-13.

2. To use the box culvert nomograph (Figure 7-13 in Appendix B of this Manual) for full flow for other than square boxes:

a. Compute cross-sectional area of the rectangular box.

b. Connect proper point (see subsection 7.4.3A.1. above) on length scale to barrel area and mark point on turning line.

c. The area scale on the nomograph is calculated for barrel cross- sections with span B twice the height D; its close correspondence with area of square boxes assures it may be used for all sections intermediate between square and B = 2D or B = 0.5D. For other box proportions use Equation 7-11 for more accurate results.

d. Pivot the straightedge on this point on the turning line and connect given discharge rate. Read head in feet on the head (H) scale.

7.4.4 Example 7-1

The following example problem utilizes computation Tabie 7-2 for a culvert rating curve calculation.

Given:	Culvert size	= 48 inches RCP
	length L	=110 feet
	n value	=0.012
	Inlet elevation	= 720.0 feet
	outlet elevation	= 718.8 feet
	slope S_0	=0.010
Entrance condition (square edge), K_e		= 0.50
Maximum elevation for embankment		=732.0 ft.

Find: Culvert rating curve

Tabie 7-2 is used to take the computations for the culvert design.

Step 1. List the elevations for headwater depths in Column 1. Then put headwater depth and ratio of headwater depth to culvert height (or pipe diameter) in Column 2 and Column 3.

Step 2. Based on the inlet control conditions, the ratio of HW/D is used to find the flows (Q) which are put in Column 4. In this example, Item (B) in Figure 7-5 in Appendix B of this Manual is utilized.

Step 3. For outlet control conditions, the flow rate Q in Column 4 is used to determine the head loss (H) in Column 5. In this example, Figure 7-12 in Appendix B of this Manual is utilized.

Step 4. If the tailwater rating curve is available, the tailwater (TW) depth can be entered in Column 6. If the tailwater rating curve is not available, an estimate of the tailwater can be used.

Step 5. If the tailwater depth is less than the diameter of the culvert, Columns 7 and 8 should be calculated. If TW is larger than D, the TW value is entered in Column 9 for ho-

Step 6. The critical depth (cd) is found from Figures 7-18 to 7-22 in Appendix B of this manual, and then used to compile Column 8.

Step 7. The headwater depth (HW) now can be computed from Equation 7-12.

Step 8. Compare the two (2) headwater depth values from Column 2 and Column 10. The controlling headwater depth and type of control are recorded in Column 11 and Column 12, respectively. The calculated elevation is written in Column 14.

Step 9. The rating curve for the culvert can be plotted from the values in Column 4 and Column 13.

To size a culvert crossing, the same table can be used, with some variation in the basic data. First a design Q value is selected and the maximum allowable headwater is determined. An inlet type i.e., headwall) is selected and the invert elevations and culvert slope are estimated based upon site constraints. A culvert type is then selected and first rated for inlet control then outlet control. If the controlling headwater exceeds the maximum allowable headwater, the input data is modified and the procedure repeated until the desired results are achieved.

7.5.0 HYDRAULIC CONSIDERATIONS IN BRIDGE DESIGN

7.5.1 General

Section 1.2.4C. and Section 1.2.4D. of this Manual state the City's position concerning storm water overtopping bridge structures. The current policy for overtopping of residential streets is a maximum of twelve (12) inches for the 100 year frequency storm, and for any street other than residential, the allowable maximum is six (6) inches for the 100 year frequency storm.

Several hydraulic parameters should be considered in bridge design. Among these considerations should be, but should not be limited to, the following:

A. Channel transitions into and out of the bridge opening.

B. Overall length and height of bridge.

C. Cross-sectional opening of bridge.

D. Location of the bridge opening relative to the main channel.

E. Bridge alignment relative to general flow of main channel i.e., "skewed" crossing.

F. Number of crossings or bridge openings.

G. Other obstructions to flow i.e., piers, abutments, deck width and clearances.

H. Design flows for bridge opening to pass.

I. Any freeboard requirements for channel design.

7.5.2 Types Of Flow For Bridge Design

Three (3) types of flow caused by bridge construction on a flood plain are shown in Figure 7-23 in Appendix B of this Manual. The three (3) flow types are described below:

A. **Type I Flow.**

Referring to Item A of Figure 7-23 in Appendix B of this Manual, it can be observed that normal water surface is above critical depth at all points. This has been labeled Type I, or subcritical flow, the type usually encountered in practice. The backwater expression for Type I flow is obtained by applying the conservation of energy principle between cross-sections 1 and 4.

B. **Type IIA Flow.**

There are at least two (2) variations of Type II flow which will be described here as Types IIA and IIB. For Type IIA flow, Item B of Figure 7-23 in Appendix B of this Manual, normal water surface in the unconstricted channel again remains above critical depth in the constriction. Once critical depth is penetrated, the water surface upstream from the constriction, and thus the backwater, becomes independent of conditions downstream (even though the water surface returns to normal stage at cross-section 4).

C. **Type IIB Flow.**

The water surface for Type IIB flow, Item C of Figure 7-23 in Appendix B of this Manual, starts out above both normal water surface and critical depth upstream, passes through critical depth in the constriction and then returns to normal. The return to normal depth can be rather abrupt as in Item C of Figure 7-23 in Appendix B of this Manual, taking place in the form of a poor hydraulic jump, since normal water surface in the stream is above critical depth.

D. **Type III Flow.**

In Type III Flow, Item D of Figure 7-23 in Appendix B of this Manual, the normal water surface is below critical depth at all points and the flow throughout is supercritical. This is an unusual case requiring a steep gradient but such conditions do exist, particularly in mountainous regions. Theoretically, backwater should not occur for this type, since the flow throughout is supercritical. It is more

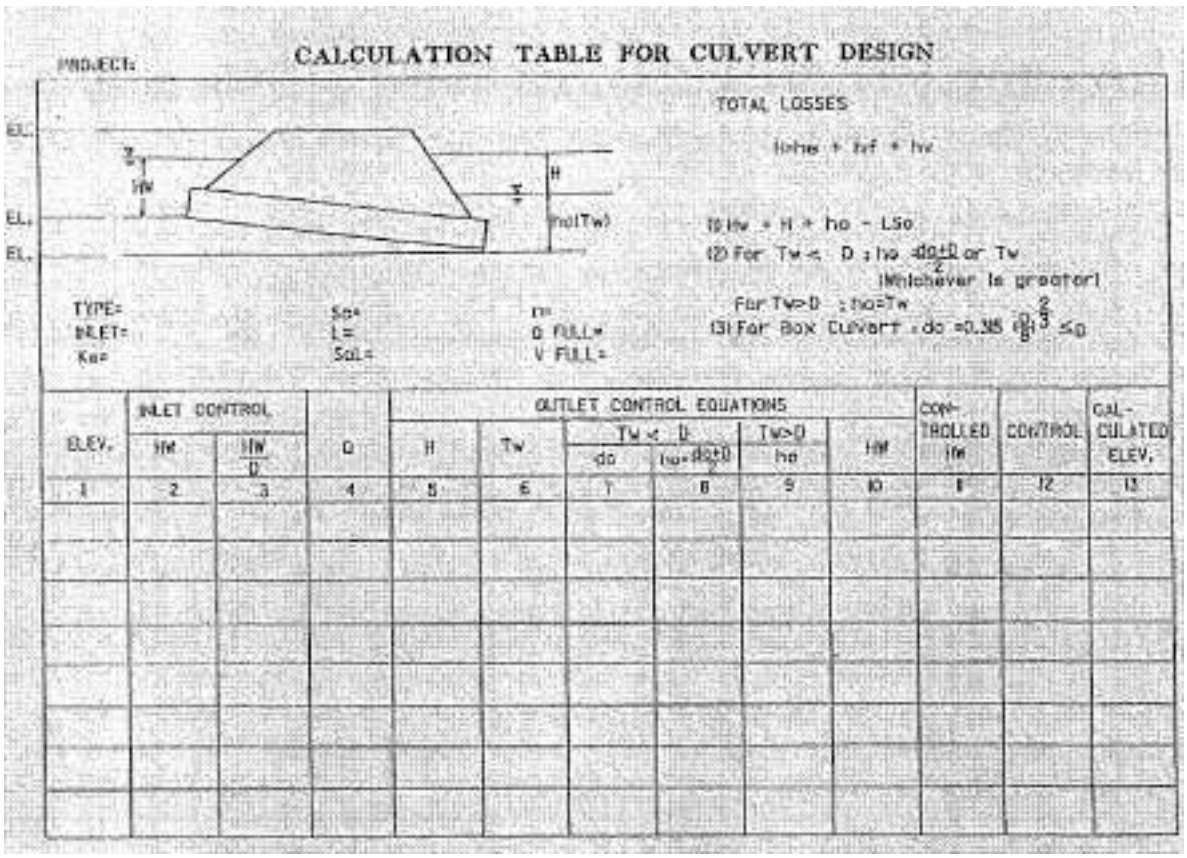
than likely that an undulation of the water surface will occur in the vicinity of the constriction, as indicated on Item D of Figure 7-23 in Appendix B of this Manual.

A more thorough and complete discussion of these parameters and preliminary design procedures are presented in Chapters 1 and 11 of Hydraulics of Bridge Waterways by U.S. Department of Transportation Federal Highway Administration, Second Edition, September, 1973.

7.5.3 Modeling Hydraulic Conditions

The most commonly used backwater program for modeling hydraulic conditions at existing or proposed bridge crossings is the U.S. Army Corps of Engineers HEC-RAS Water Surface Profiles Program. The normal and special bridge routines contained within the program are widely used. A thorough discussion of the application of these bridge routines are presented in the HEC-RAS User's Manual. HEC-RAS software is available from the U.S. Army Corps of Engineers Hydrologic Engineering Center.

Table 7-2 Calculation Table for Culvert Design



CALCULATION TABLE FOR CULVERT DESIGN

PROJECT:

TOTAL LOSSES

$h_t = h_e + h_f + h_v$

(1) $HW = H + h_o - LS_o$

(2) For $T_w \le D$; $h_o = \frac{d_o + D}{2}$ or T_w (whichever is greater)

For $T_w > D$; $h_o = T_w$

(3) For Box Culvert ; $d_o = 0.36 \left(\frac{Q}{B}\right)^{\frac{2}{3}} \le D$

TYPE=
INLET=
Ke=

Se=
L=
SoL=

n=
Q FULL=
V FULL=

ELEV.	INLET CONTROL		Q	OUTLET CONTROL EQUATIONS						CON-TROLLED	CONTROL	CAL-CULATED ELEV.
	HW	HW/D		H	Tw	Tw < D		Tw>D	HW	HW		
						do	$h_o = \frac{d_o+D}{2}$	ho				
1	2	3	4	5	6	7	8	9	10	11	12	13

Example Table 7-2 Calculation Table for Culvert Design

PROJECT:

CALCULATION TABLE FOR CULVERT DESIGN

TOTAL LOSSES

$H = he + hf + hv$

(1) $Hw = H + ho - LSo$

(2) For $Tw < D$; $ho = \frac{do+D}{2}$ or Tw (Whichever Is greater)

For $Tw > D$; $ho = Tw$

(3) For Box Culvert ; $do = 0.315 \left(\frac{Q}{B}\right)^{\frac{2}{3}} \leq D$

TYPE= 48" RCP
INLET=SQUARE EDGE
Ke= 0.5

So=0.010
L= 110'
Sol.=1.10

n= 0.012
Q FULL=160 CFS
V FULL=12.4 fps

ELEV.	INLET CONTROL		Q	OUTLET CONTROL EQUATIONS						CON-TROLLED HW	CONTROL	CAL-CULATED ELEV.
	HW	HW/D		H	Tw	Tw < D		Tw>D	HW			
						do	$ho = \frac{do+D}{2}$	ho				
1	2	3	4	5	6	7	8	9	10	11	12	13
720	0	0	0									720.0
724	4	1	70	0.94		2.55	3.28		3.12	4	INLET	724.0
725	5	1.25	95	1.72		2.90	3.45		4.07	5	INLET	725.0
726	6	1.5	115	2.60		3.20	3.60		5.10	6	INLET	726.0
728	8	2.0	150	4.50		3.60	3.80		7.20	8	INLET	728.0
730	10	2.5	170	5.80		3.85	3.93		8.63	10	INLET	730.0

SECTION 8- STORMWATER MANAGEMENT

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SECTION 8 - STORMWATER MANAGEMENT

8.1.0 GENERAL

Stormwater Management (SWM) programs aimed at controlling increased urban runoff generated by development are a top priority in urban planning. More frequent flooding, increased rates and volumes of runoff, increased stream channel erosion and degradation, increased sedimentation and increased water pollution are all problems intensified by development. SWM facilities such as detention, retention, extended detention, infiltration, and sedimentation ponds have proven to significantly reduce downstream flooding, reduce sediment and pollutant loads, and provide debris removal which can benefit water quality.

The basic concept of SWM for peak rates of runoff is to provide for a temporary storage of stormwater runoff. Runoff is then released at a controlled rate which cannot exceed the capacities of the existing downstream drainage systems, or the predeveloped peak runoff rate of the site, whichever is less.

The solid lined hydrograph shown in Figure 8-1 in Appendix B of this Manual represents a storm runoff event without SWM, while the dashed line hydrograph depicts the same event with SWM. The peak flow of the undetained hydrograph could exceed the capacity of the downstream conveyance system and thereby cause surcharging and flooding problems. With the introduction of the SWM facility, the solid lined hydrograph is spread over a longer time period and its peak is reduced. The area between the two (2) curves to the left of their intersection represents the volume of runoff, temporarily stored or detained in the SWM facility.

The City approaches the control of excess flows through the application of both on-site and regional SWM. Essentially, the distinction between the two approaches is that on-site is generally limited to site specific criteria, while regional incorporates a basin wide hydrologic analysis.

8.2.0 REGIONAL STORMWATER MANAGEMENT PROGRAM

8.2.1 General

The Regional Stormwater Management Program (RSMP) provides for the planning, design and construction of regional drainage improvements, using fees paid by the owners of those developments. The RSMP uses a watershed-wide approach to analyze potential flooding problems, identify appropriate mitigation measures, and select site locations and design criteria for regional drainage improvements. These improvements include detention and retention ponds, waterway enlargement and channelization, and improved conveyance structures. The RSMP allows developers to participate in the

program (in lieu of constructing on-site controls) if the resulting use of regional drainage improvements will produce no identifiable adverse impact to other properties due to increased runoff from the proposed development.

The fees charged for participation in the RSMP are non-refundable and are based upon the size of the development, and the proposed land use. The fees are deposited in a dedicated fund.

The benefits afforded by the RSMP include the following:

A. A higher level of confidence in the hydrologic analysis is obtained because each pond's interrelationship within a given basin can be readily determined. This is accomplished by establishing a hydrologic data base watershed master plan of the entire basin, and then using this to determine the most hydrologically efficient location for SWM facilities. This procedure takes into consideration the interrelated nature of tributary subareas within a watershed.

B. Adequate maintenance is more likely due to the City's vested interest and responsibility in the RSMP.

C. The cost of construction and the total land required can be considerably less than that needed for comparable on-site SWM

D. The expanded land area required for regional ponds lends itself to other uses (e.g., parks, nature areas, organized sports, etc.).

8.3.0 STORMWATER MANAGEMENT PONDS

8.3.1 General

Stormwater Management (SWM) ponds may be of two basic types: On-site and regional.

In general, on-site ponds are those which are located off-channel and provide stormwater management for a particular project or development. Regional ponds are designed to provide stormwater management in conjunction with other improvements on a watershed-wide basis. SWM ponds may be further classified as retention or detention ponds and may incorporate water quality Best Management Practices (BMPs) such as sedimentation, infiltration, or filtration. The performance and safety criteria in this Section apply to all ponds which provide management of peak rates of stormwater runoff regardless of type.

8.3.2 Performance Criteria for on-Site SWM Ponds

A. On-site SWM ponds are further classified as either small or large, as follows:

ON-SITE SWM POND CLASS	DRAINAGE AREA
Small	<25 acres
Large	25-64 acres

For design purposes, any pond with a drainage area larger than sixty-four (64) acres shall be classified as regional pond.

B. On-site SWM ponds shall be designed to reduce post-development peak rates of discharge to existing pre-development peak rates of discharge for the 2, 10, and 25 year storm events at each point of discharge from the project or development site. For the post-development hydrologic analysis, any off-site areas which drain to the pond shall be assumed to remain in the existing developed condition.

8.3.3 Performance Criteria For Regional SWM Ponds

A. Regional SWM ponds are classified as small and large, based on the following criteria:

REGIONAL POND CLASS	IMPOUNDED VOLUME, AC-FT
Small	0-150
Large	>150

Any regional pond with a height of dam over fifteen (15) feet shall be classified as a large regional pond.

B. Performance criteria for regional ponds shall be determined by the Engineering and Development Services Department on a project-by-project basis. The determination shall be based on a preliminary engineering study prepared by the Engineer.

8.3.4 Safety Criteria For SWM Ponds

All ponds shall meet or exceed all specified safety criteria. Use of these criteria shall in no way relieve the Engineer of the responsibility for the adequacy and safety of all aspects of the design of the SWM pond.

A. The spillway, embankment, and appurtenant structures shall be designed to safely pass the design storm hydrograph with the freeboard shown in the table below. All contributing drainage areas, including on-site and off-site areas, shall be assumed to be fully developed. Any orifice with a dimension smaller than or equal to twelve (12) inches shall be assumed to be fully blocked. For all spillways (especially enclosed conduits), the ability to adequately convey the design flows must take into account any submergence of the outlet, any existing or potential obstructions in the system and the capacity of the downstream system. For these reasons, enclosed conduit spillways connecting directly to other enclosed conduit systems are discouraged. If used, they must be justified by a rigorous analysis of all enclosed conduit systems connected to the spillway.

DETENTION POND CLASS		DESIGN STORM EVENT	FREEBOARD TO TOP OF EMBANKMENT, FT.
On-site:	Small	25 year	0
	Large	25 year	1.0
Regional:	Small	100 year	2.0
	Large	100 year	*

*Design storm event and required freeboard for large regional ponds shall be determined by a dam break analysis based on the principles outlined in Title 30, Part 1, Chapter 299 of the Texas Administrative Code. The dam break analysis shall be submitted to the Engineering and Development Services Department for approval.

B. If an embankment is classified as a dam pursuant to Title 30, Part 1, Chapter 299 of the Texas Administrative Code, all design criteria found in Title 30, Part 1, Chapter 299 of the Texas Administrative Code must be met, as evidenced by certification by an engineer licensed in the State of Texas.

C. All SWM ponds shall be designed using a hydrograph routing methodology.

D. The minimum embankment top width of earthen embankments shall be as follows:

TOTAL HEIGHT OF EMBANKMENT, FT,	MINIMUM TOP WIDTH, FT.
0-5	7
5-15	15
15-+	*

*To be determined on a case by case basis by the City Engineer.

E. The constructed height of an earthen embankment shall be equal to the design height plus the amount necessary to ensure that the design height will be maintained once all settlement has taken place.

This amount shall in no case be less than five (5) percent of the total fill height. All earthen embankments shall be compacted to ninety-five (95) percent of maximum density.

F. Earthen embankment side slopes shall be no steeper than four (4) horizontal to one (1) vertical. Slopes must be designed to resist erosion to be stable in all conditions, and to be easily maintained. Earthen side slopes for regional facilities shall be designed on the basis of appropriate geotechnical analyses.

G. Detailed hydraulic design calculations shall be provided for all SWM ponds. Stage-discharge rating data shall be presented in tabular form with all discharge components, such as orifice, weir, and outlet conduit flows, clearly indicated. Stage-storage table shall also be provided. In all cases, the effects of tailwater or other outlet control considerations should be included in the rating table calculations.

H. When designing ponds in series (i.e., when the discharge of one (1) becomes the inflow of another), the engineer must submit a hydrologic analysis which demonstrates the system's adequacy. This analysis must incorporate the construction of hydrographs for all inflow and outflow components.

I. No outlet structures from detention, filtration and/or sedimentation ponds, parking detention or other concentrating structures shall be designed to discharge concentrated flow directly onto arterial or collector streets. Such discharges shall be conveyed by a closed conduit to the nearest existing storm sewer. If there is no existing storm sewer within three hundred (300) feet, the outlet design shall provide for a change in the discharge pattern from concentrated flow back to sheet flow, following as near as possible the direction of the gutter.

J. Storm runoff may be detained within parking lots. However, the Engineer should be aware of the inconvenience to both pedestrians and traffic. The location of ponding areas in a parking lot should be planned so that this condition is minimized. Stormwater ponding depths (for the 100 year storm) in parking lots are limited to an average of eight (8) inches with a maximum of twelve (12 inches). Maximum depths shall be permitted only in overflow parking areas not typically in daily business.

K. All pipes discharging into a public storm sewer system shall have a minimum diameter of eighteen (18) inches and shall be constructed of reinforced concrete. In all cases, ease of maintenance and/or repair must be assured.

L. All concentrated flows into a SWM pond shall be collected and conveyed into the pond in such a way as to prevent erosion of the side slopes. All outfalls into the pond shall be designed to be stable and non-erosive.

8.3.5 Outlet Structure Design

There are two basic types of outlet control structures: those incorporating orifice flow and those incorporating weir flow. Rectangular and V-notch weirs are the most common types.

Generally, if the crest thickness is more than sixty (60) percent of the nappe thickness, the weir should be considered broad-crested. The coefficients for sharp-crested and broad-crested weirs vary. The respective weir and orifice flow equations are as follows:

A. **Rectangular Weir Flow Equation** (See Figure 8-2 in Appendix B of this Manual)

$$Q = CLH^{3/2} \qquad \text{(Eq. 8-1)}$$

where

Q = Weir discharge, cubic feet per second
C = Weir Coefficient
L = horizontal length, feet
H = Head on weir, feet

B. **V - notch Weir Flow Equation** (See Figure 8-2 in Appendix B of this Manual)

$$Q = C_v \tan (0/2) H^{2.5} \qquad \text{(Eq. 8-2)}$$

where

Q = Weir Flow, cubic feet per second
C_v = Weir Coefficient
O = Angle of the weir notch at the apex (degrees)
H = Head on Weir, feet

C. **Orifice flow** equation (See Figure 8-2 in Appendix B of this Manual)

$$Q = C_o A (2gH)^{0.5} \qquad \text{(Eq. 8-3)}$$

where

Q = Orifice Flow, cubic feet per second
C_o = Orifice Coefficient (use 0.6)
A = Orifice Area, square feet
g = Gravitation constant, 32.2 feet/sec^2
H = Head on orifice measured from centerline, feet

Analytical methods and equations for other types of structures shall be approved by the SWMD prior to use.

In all cases, the effects of tailwater or other outlet control considerations should be included in the rating table calculations.

8.4.0 DETENTION POND STORAGE DETERMINATION

A flow routing analysis using detailed hydrographs must be applied for all detention pond designs. The Soil Conservation Service hydrologic methods (available in TR-20, HEC-1) and the Hydrologic Engineering Center (HEC) hydrologic methods may be used. The Engineer may use other methods but must have their acceptability approved by the City Engineer.

APPENDIX A. FIGURE AND DIAGRAMS

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APPENDIX B. FIGURE AND DIAGRAMS

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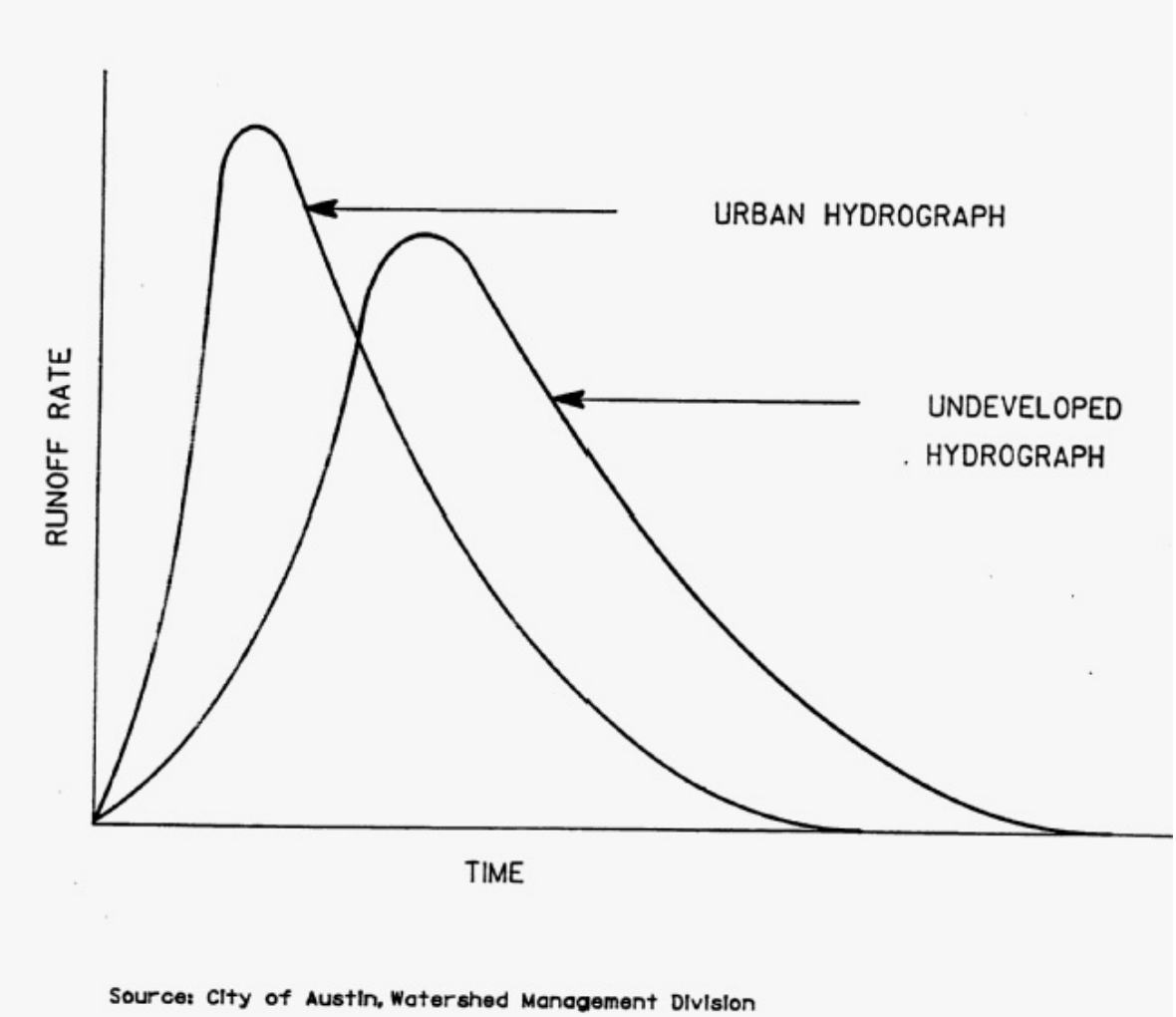


Source: City of Austin, Watershed Management Division

Figure 2-2 Intensity Duration Frequency Curve for Copperas Cove, TX

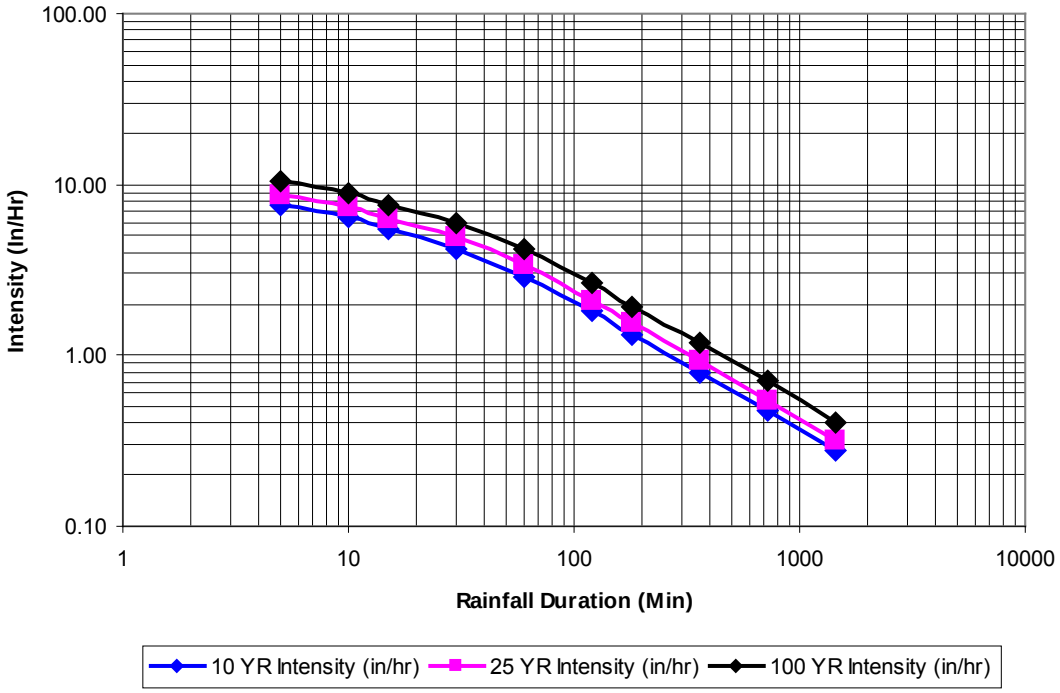
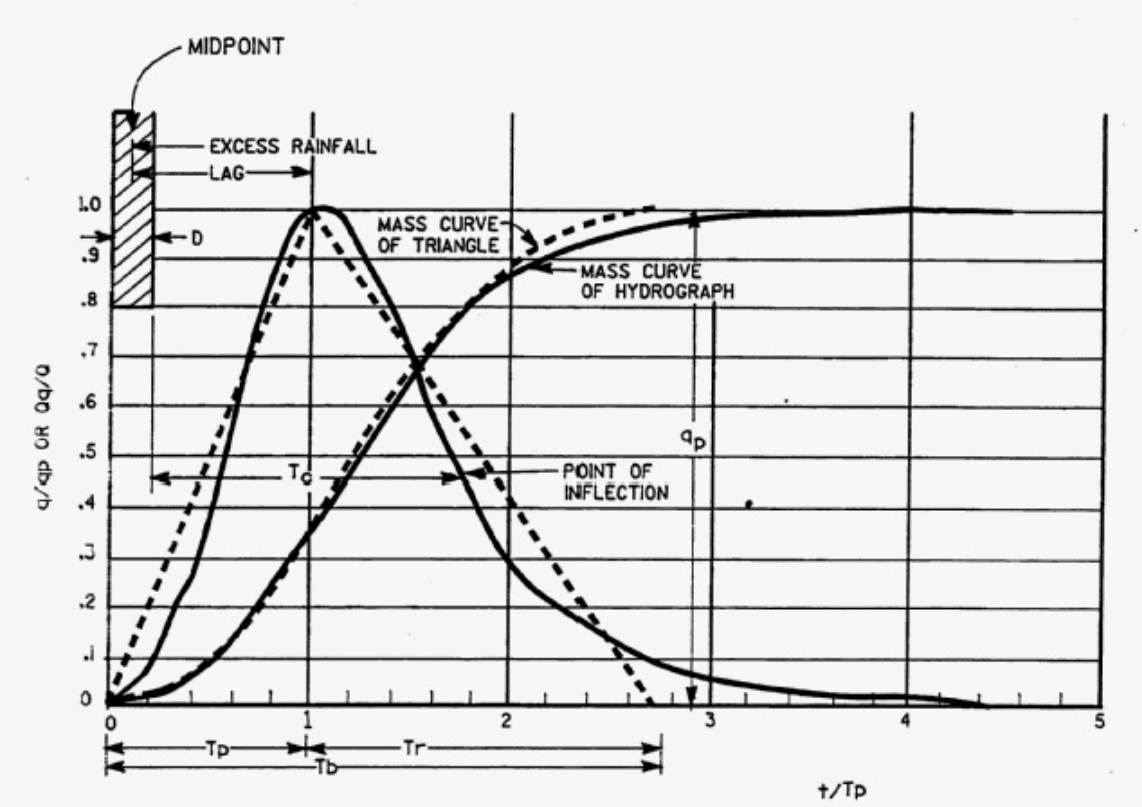


Figure 2-3 Dimensionless Curvilinear Unit Hydrograph and Equivalent Triangular Hydrograph



Source: U.S. Soil Conservation Service, "Hydrology Section 4," National Engineering Handbook. (NEH-4), 1972.

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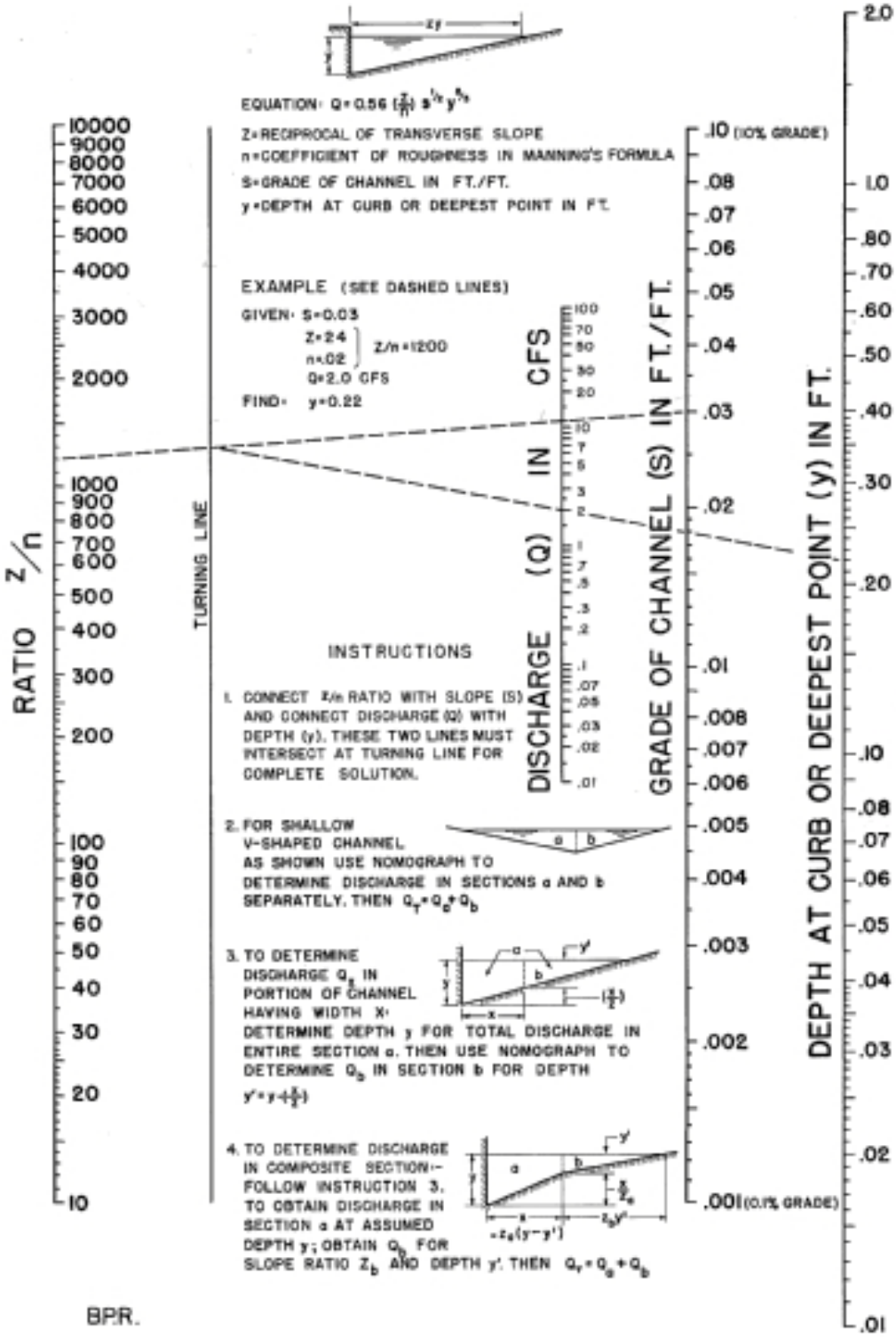
Figure 3-1 Nomograph for Flow in Gutters



Source: Texas Highway Department, Bridge Division

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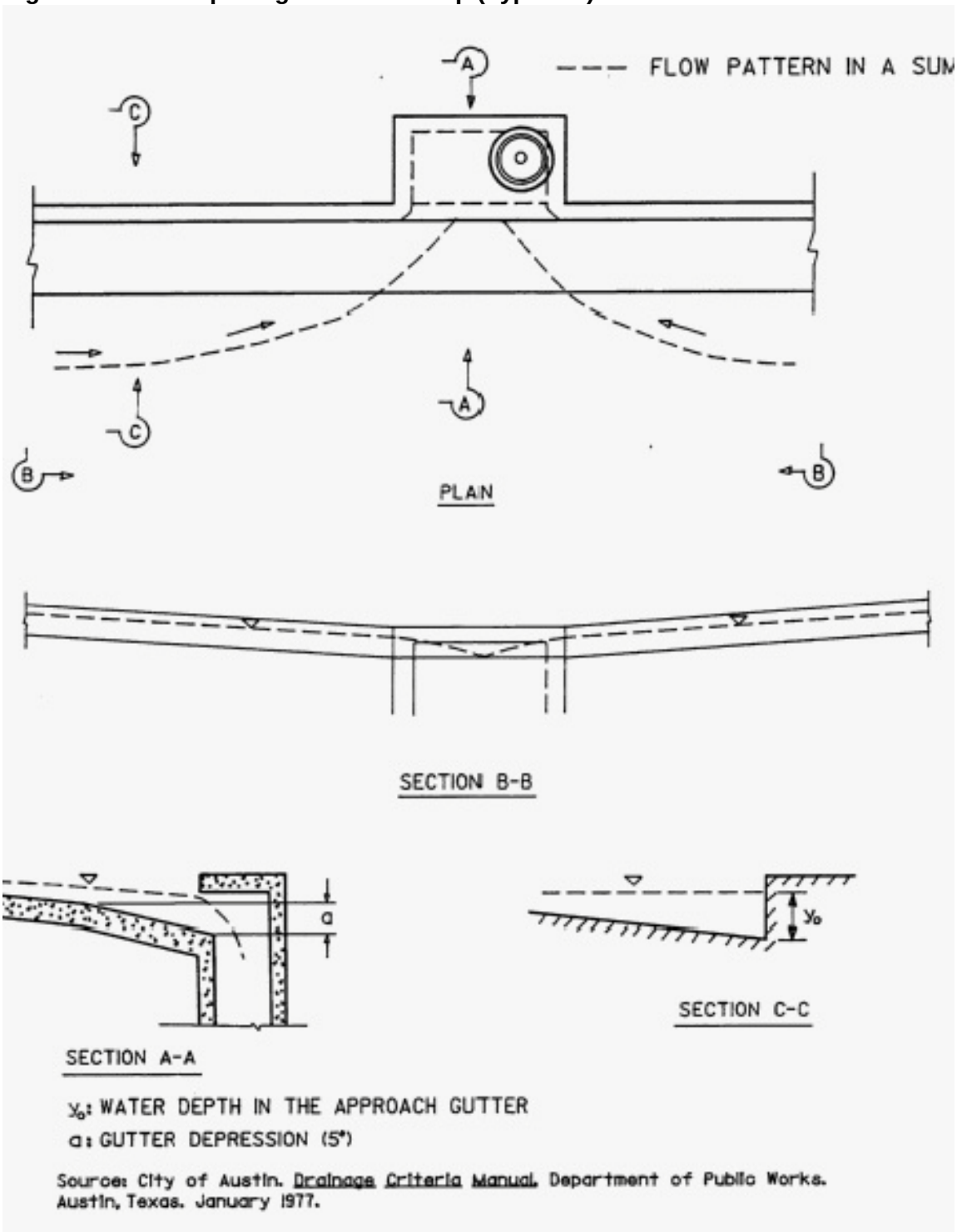
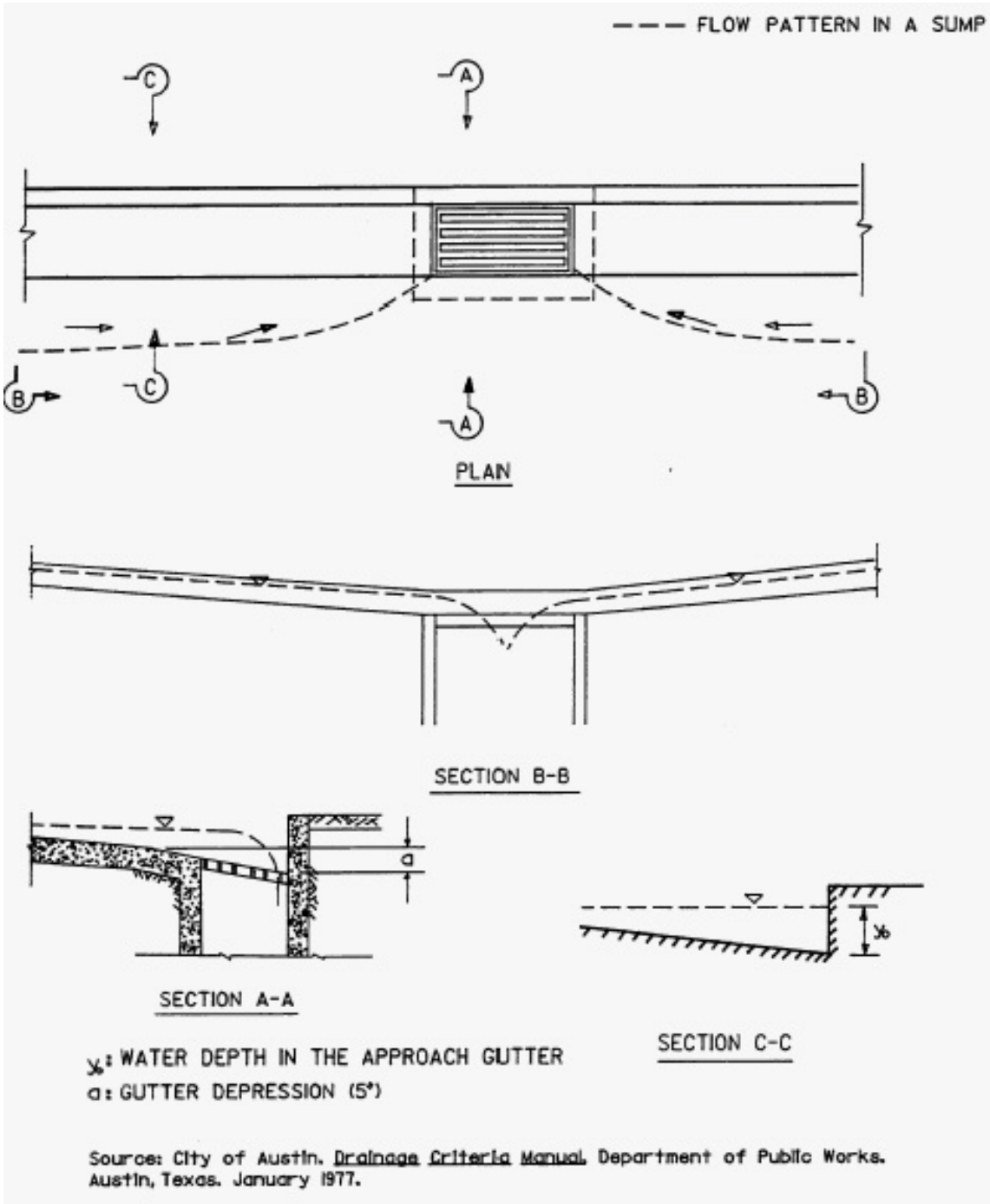
Figure 4-1 Curb Opening Inlet in a Sump (Type S-1)



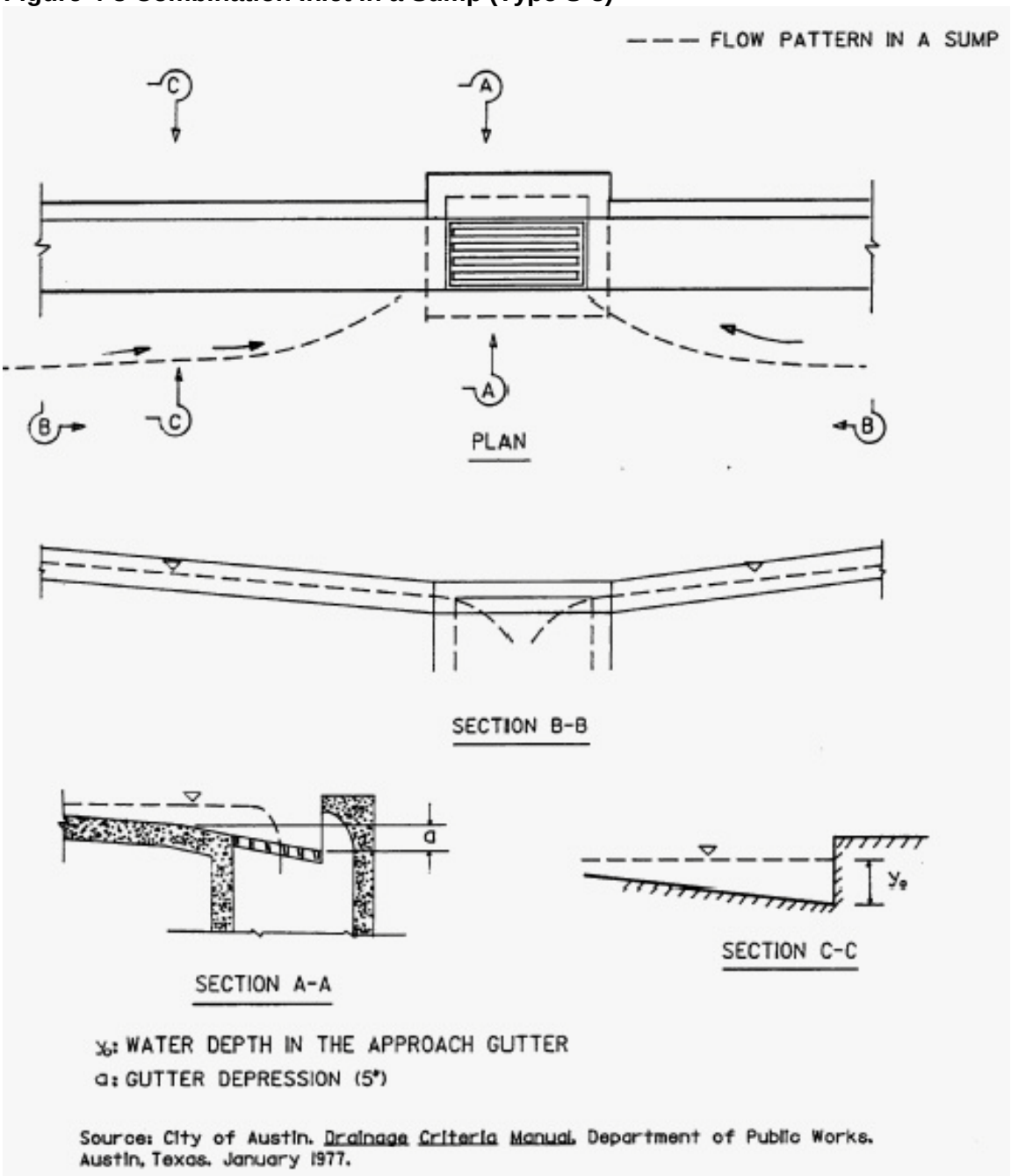
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4.2 Grate Inlet in a Sump (Type S-2)



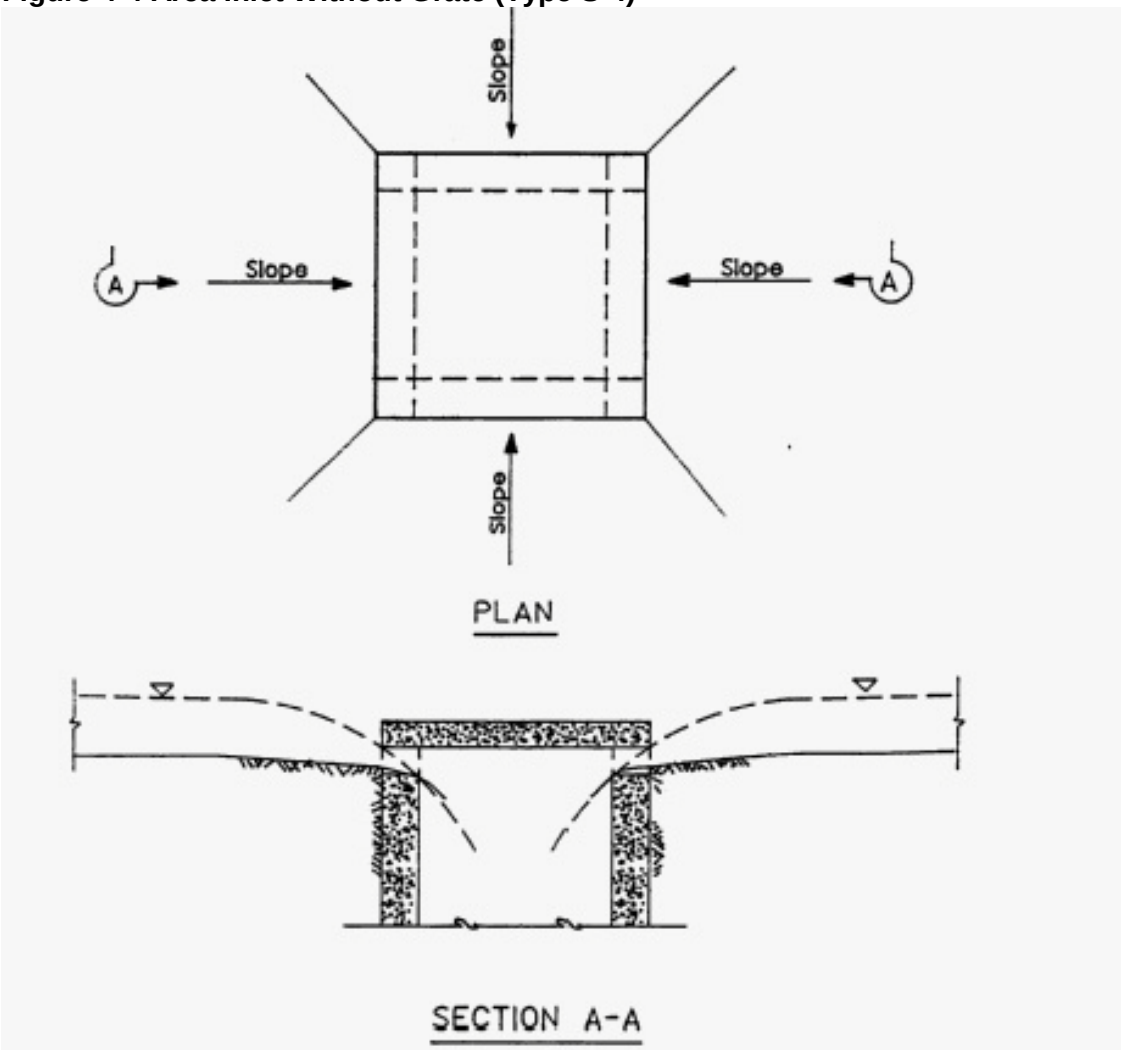
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-3 Combination Inlet in a Sump (Type S-3)



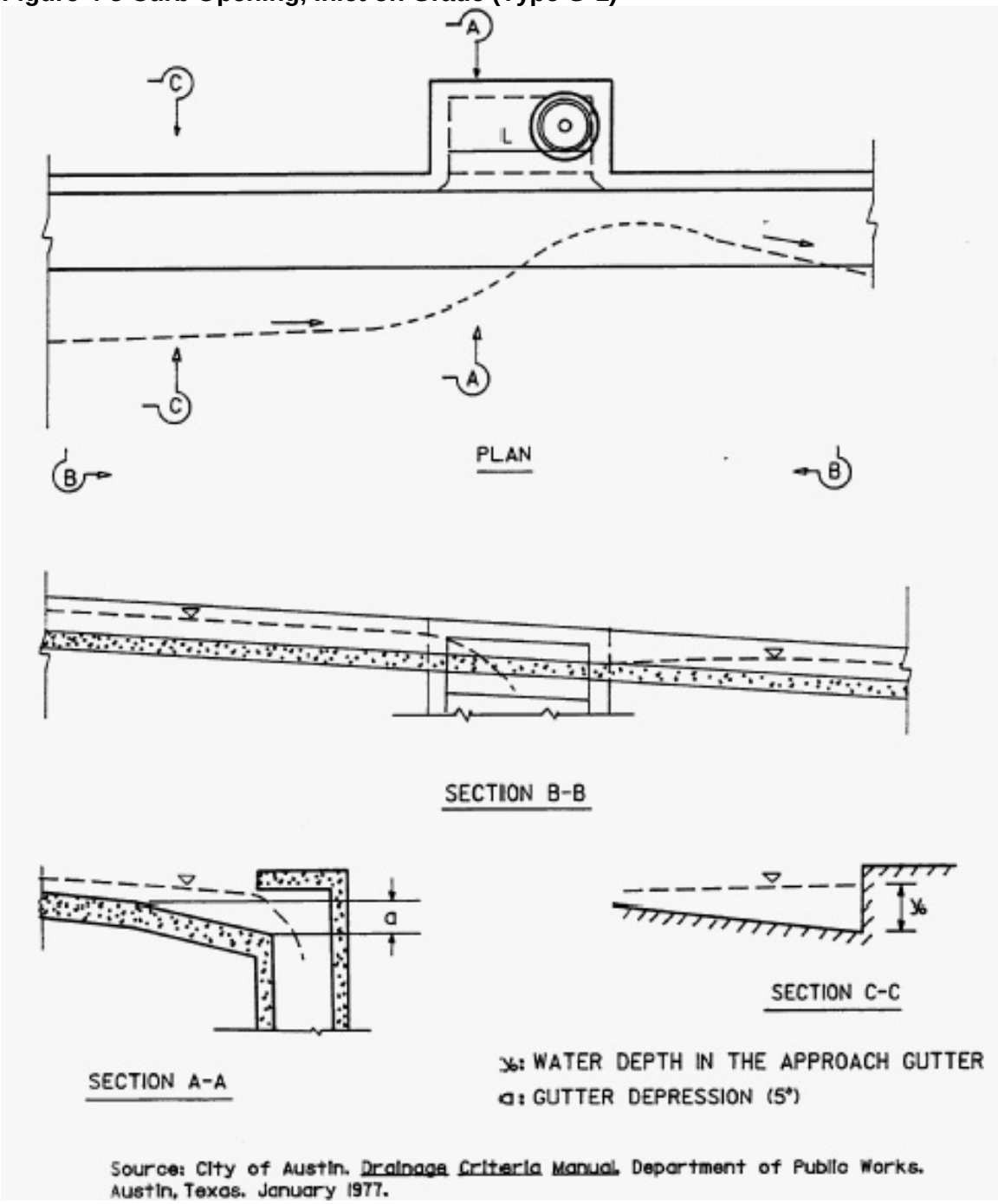
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-4 Area Inlet Without Grate (Type S-4)



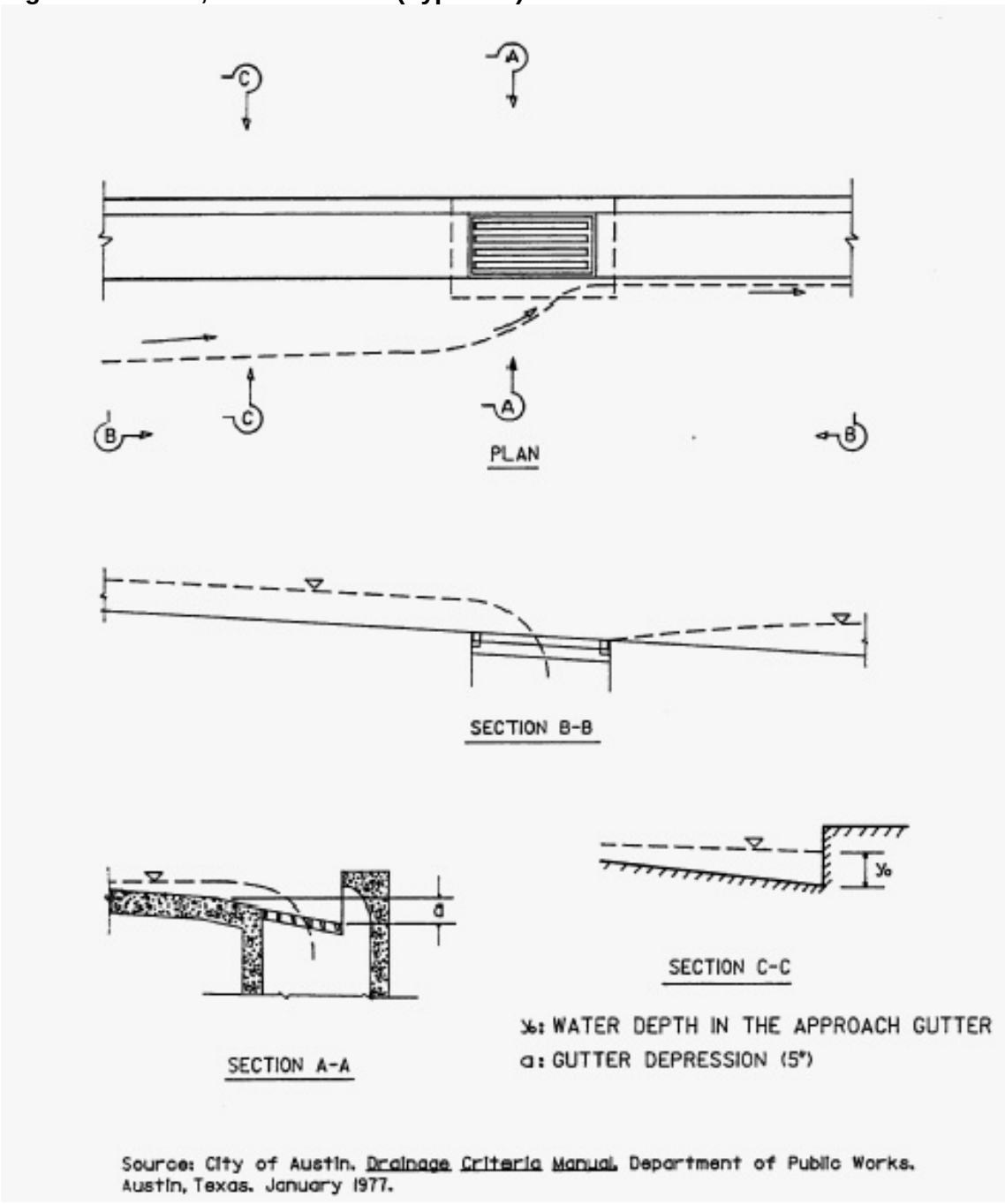
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-5 Curb Opening, Inlet on Grade (Type G-1)



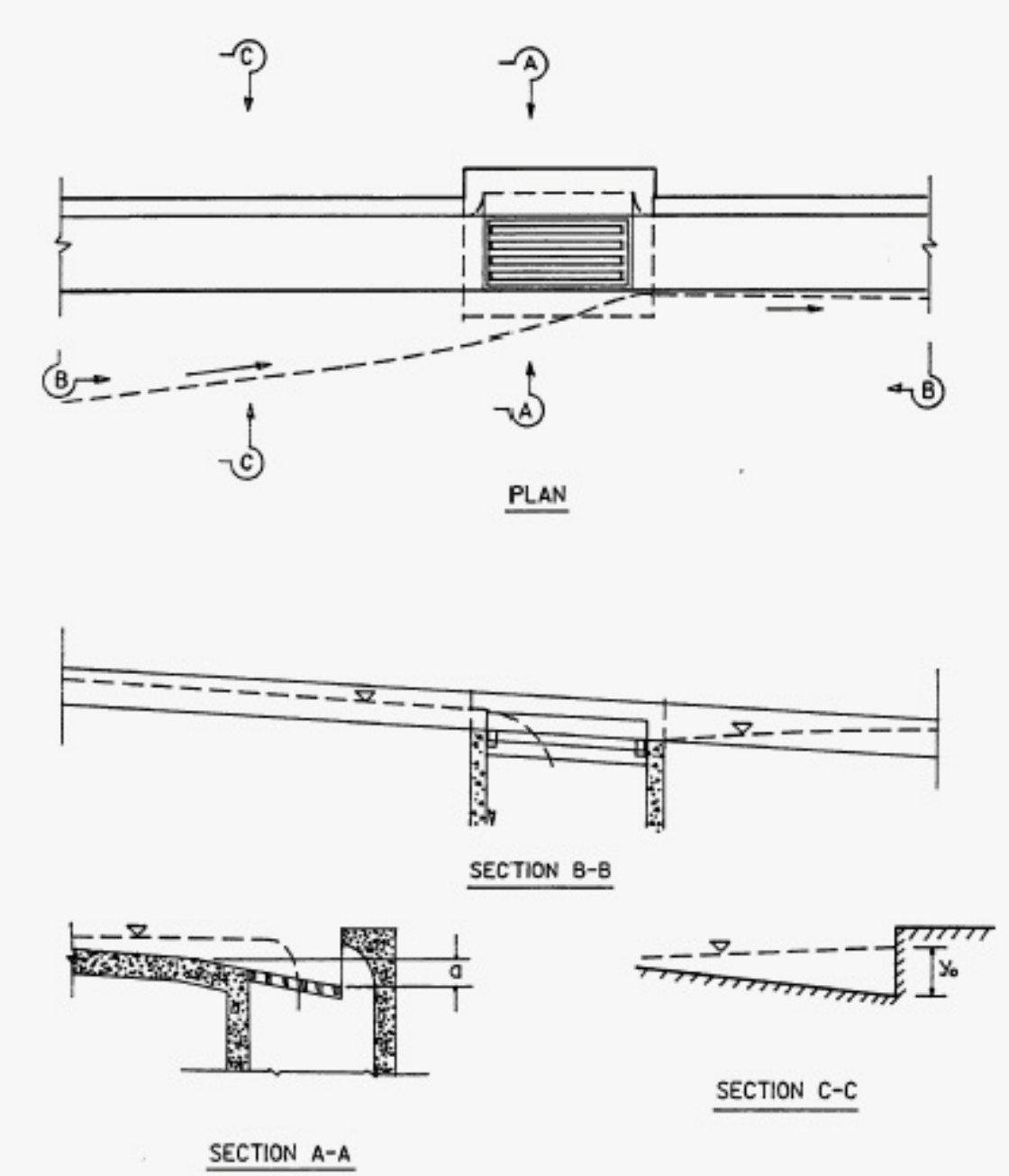
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-6 Grate, Inlet on Grade (Type G-2)



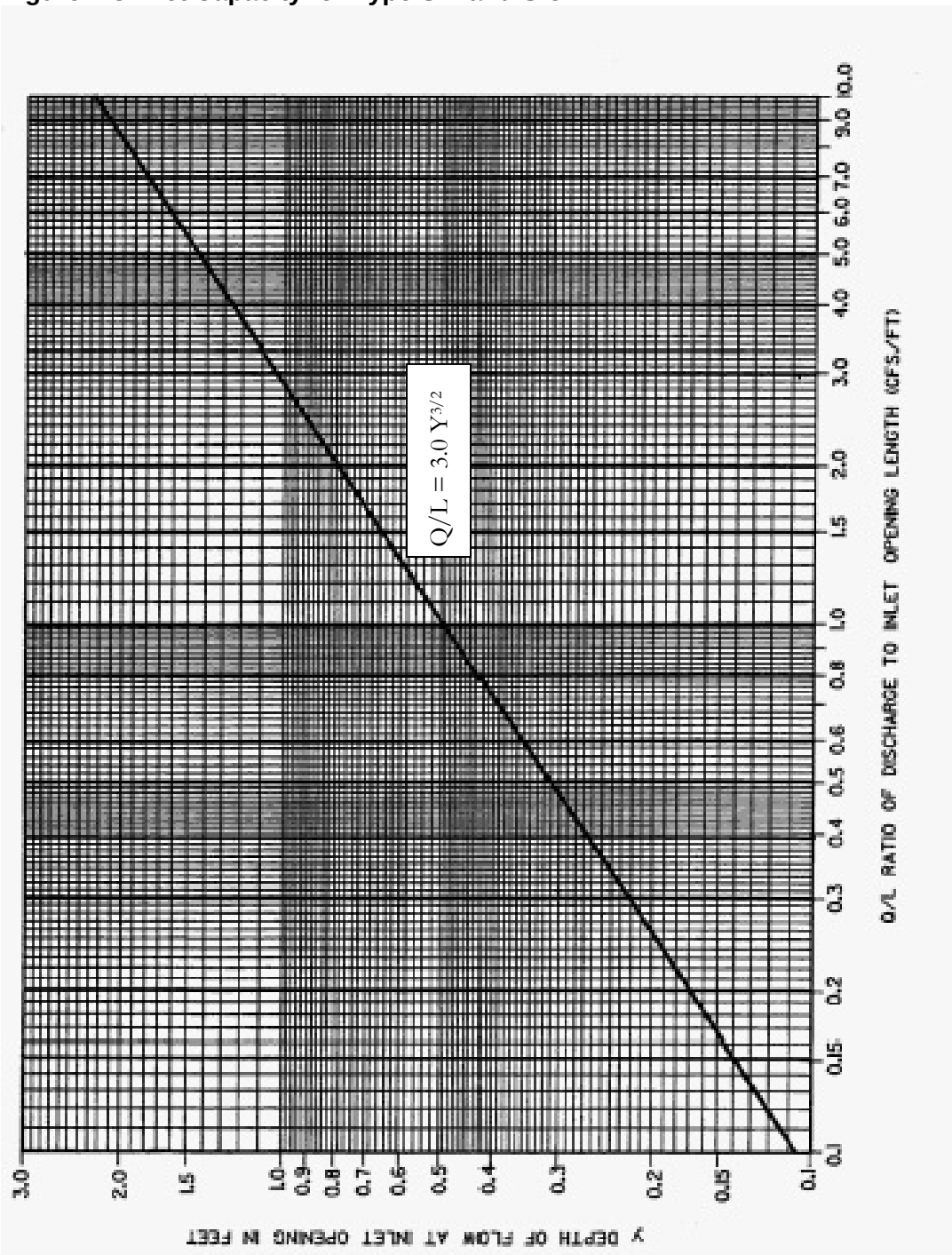
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-7 Combination Inlet on Grade (Type G-3)



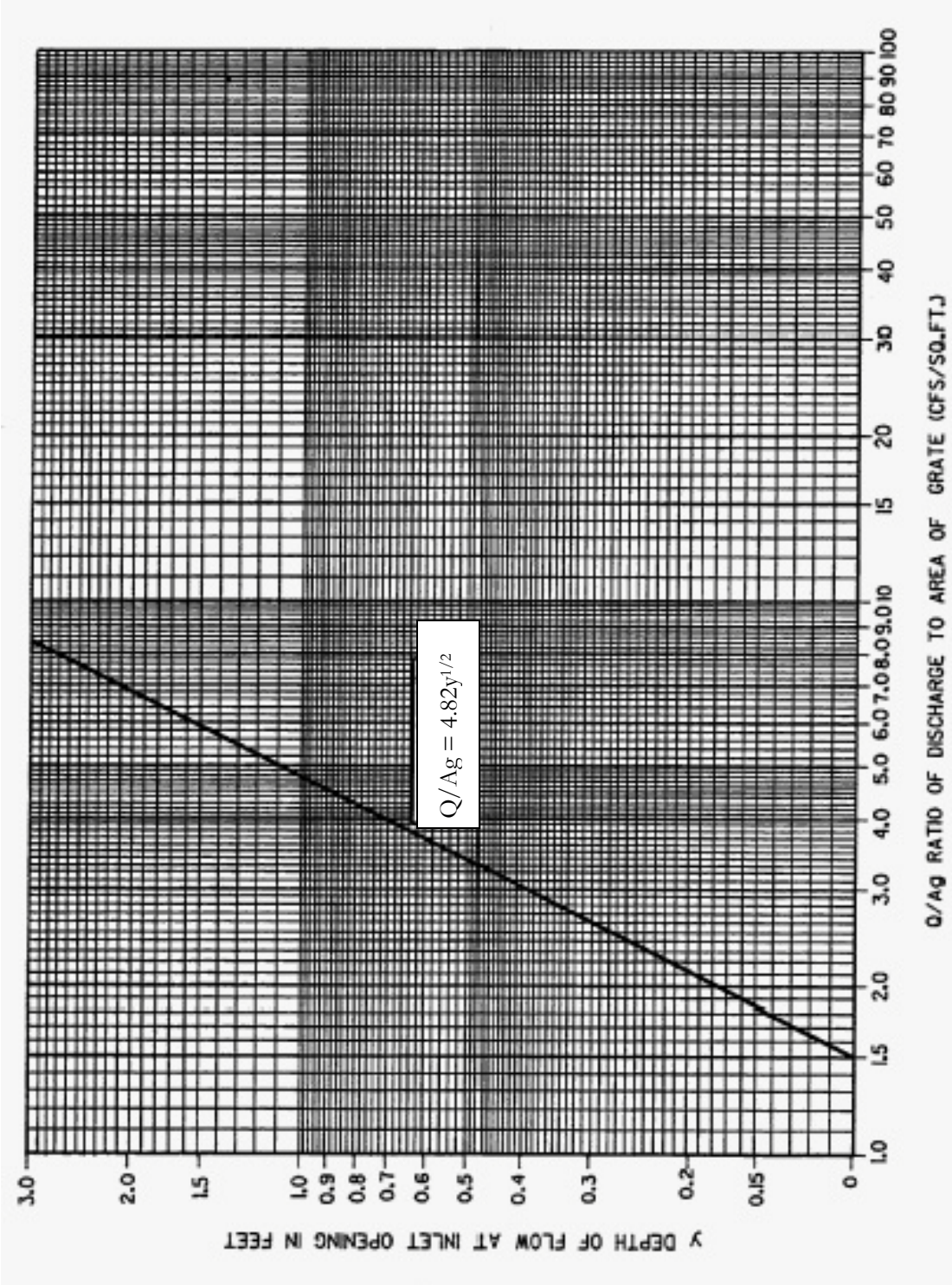
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-8 Inlet Capacity for Type S-1 and S-3



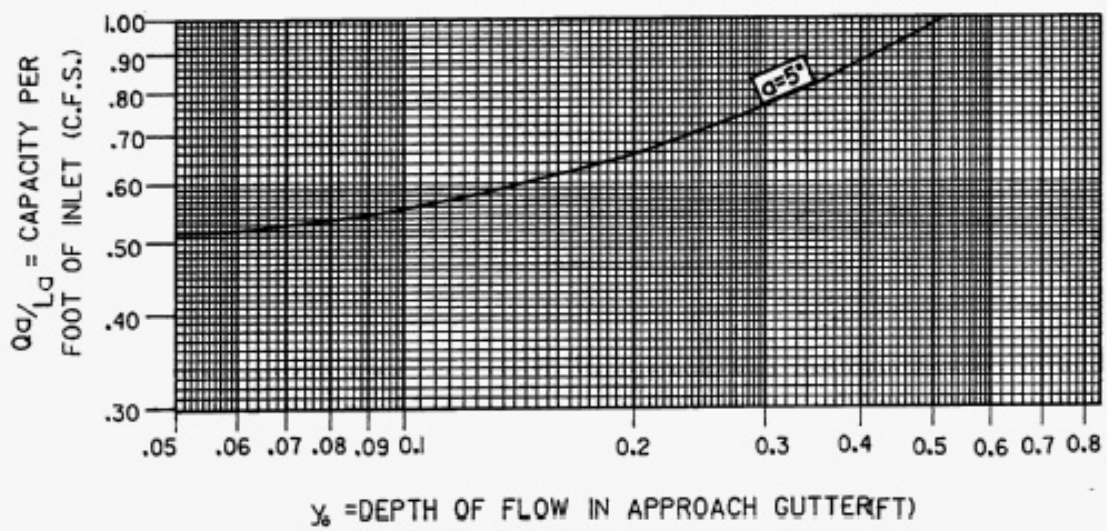
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 4-9 Inlet Capacity for Type S-2



Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas, January 1977.

Figure 4-10 Capacity for Inlets on Grade



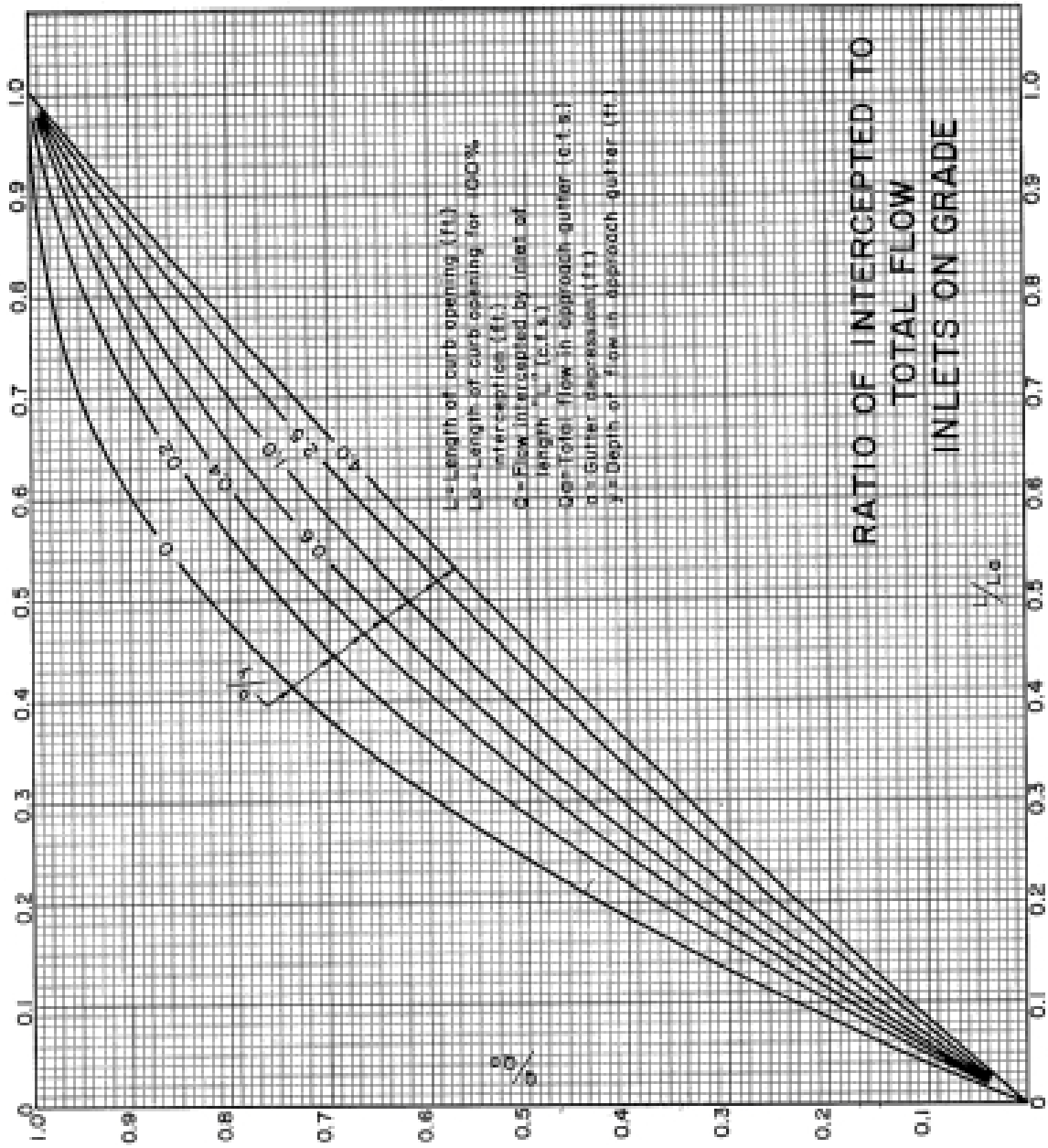
$$Q_a/L_a = 0.7\left[\frac{1}{H_1 - H_2}\right]\left[(H_1)^{5/2} - (H_2)^{5/2}\right]$$

$H_1 = a + y_o$

$H_2 = a$ = GUTTER DEPRESSION

Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

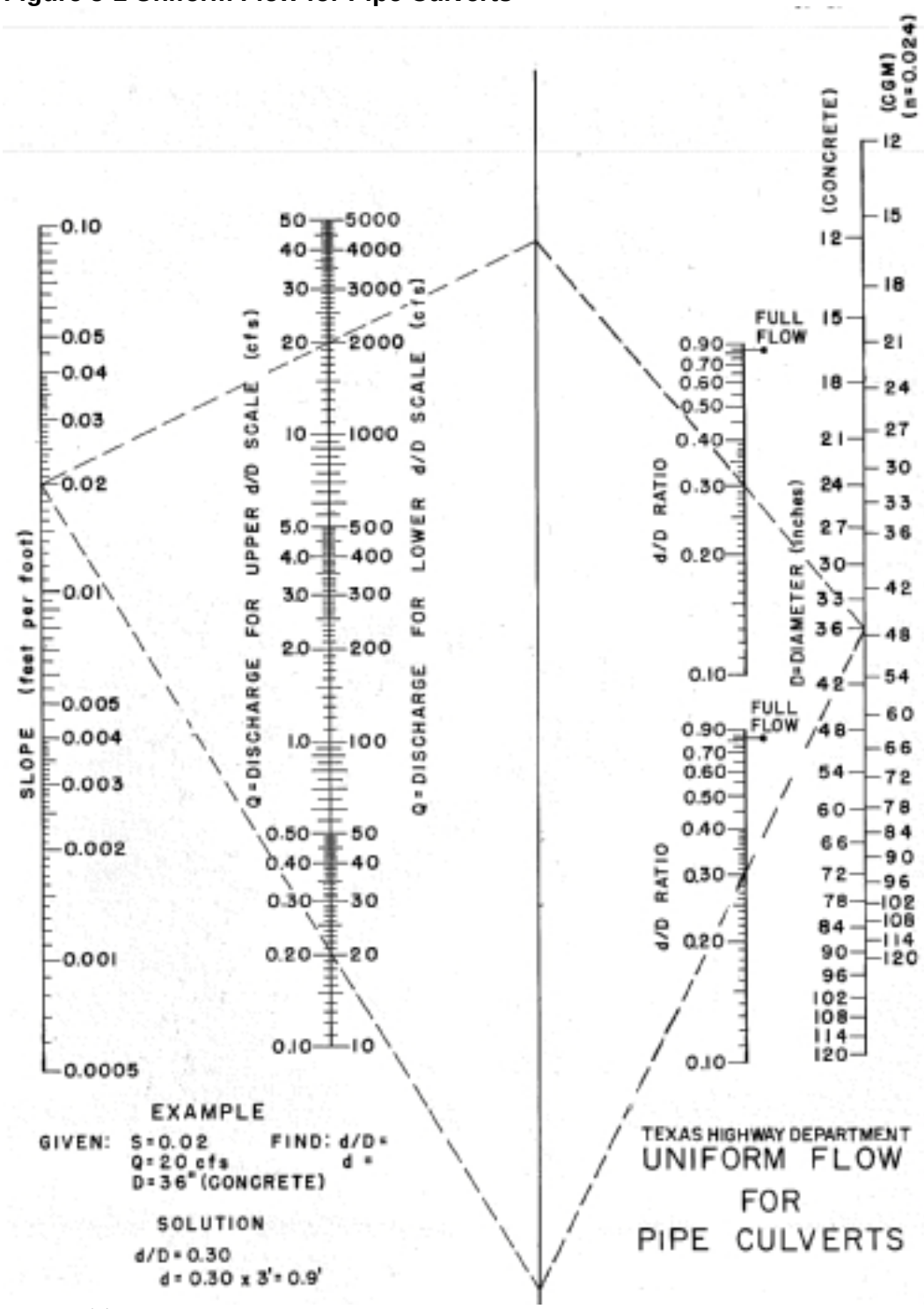
Figure 4-11 Ratio of Intercepted to Total Flow for Inlets on Grade



Source: Texas Highway Department, Bridge Division

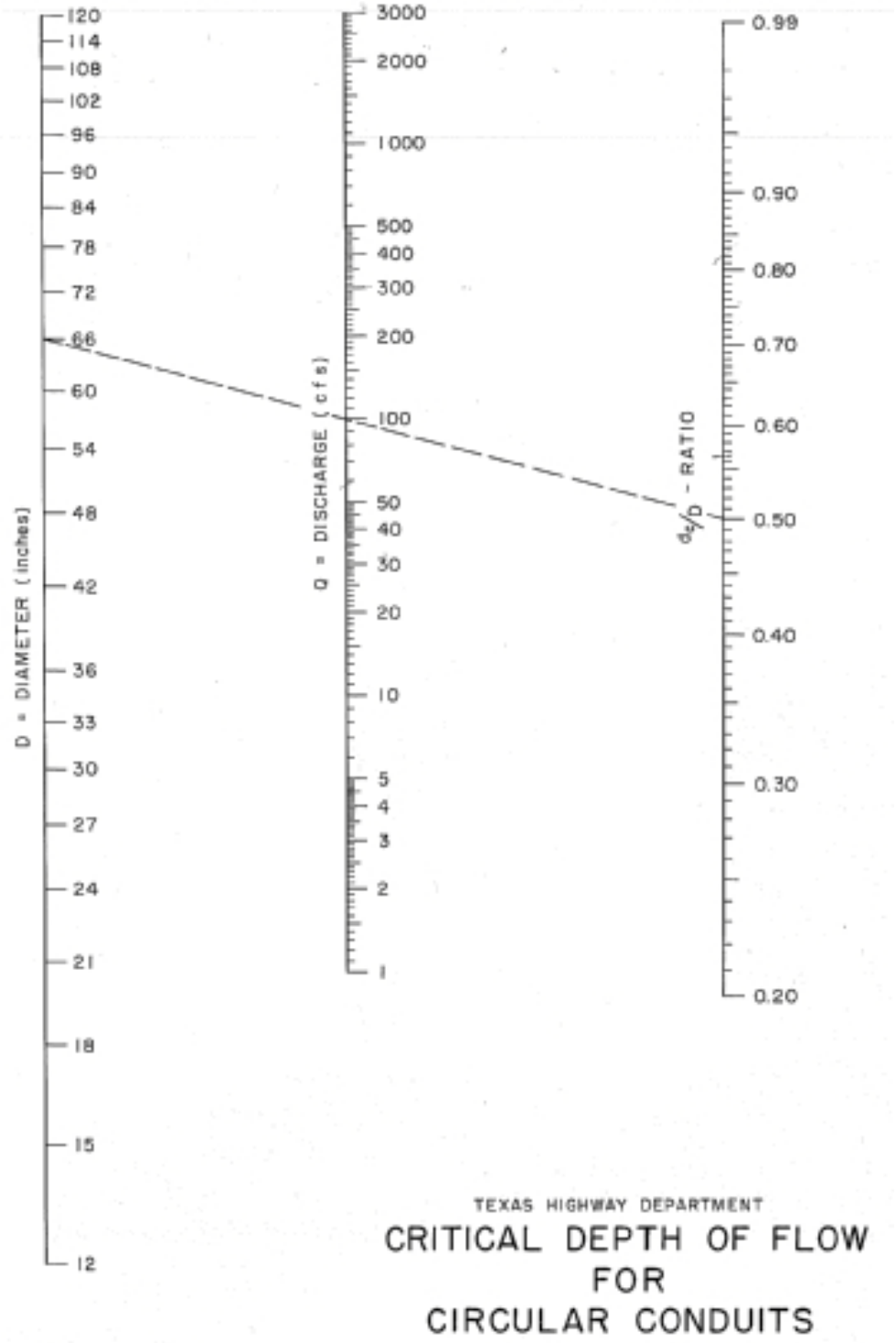
FIGURES FROM SECTION 5

Figure 5-1 Uniform Flow for Pipe Culverts



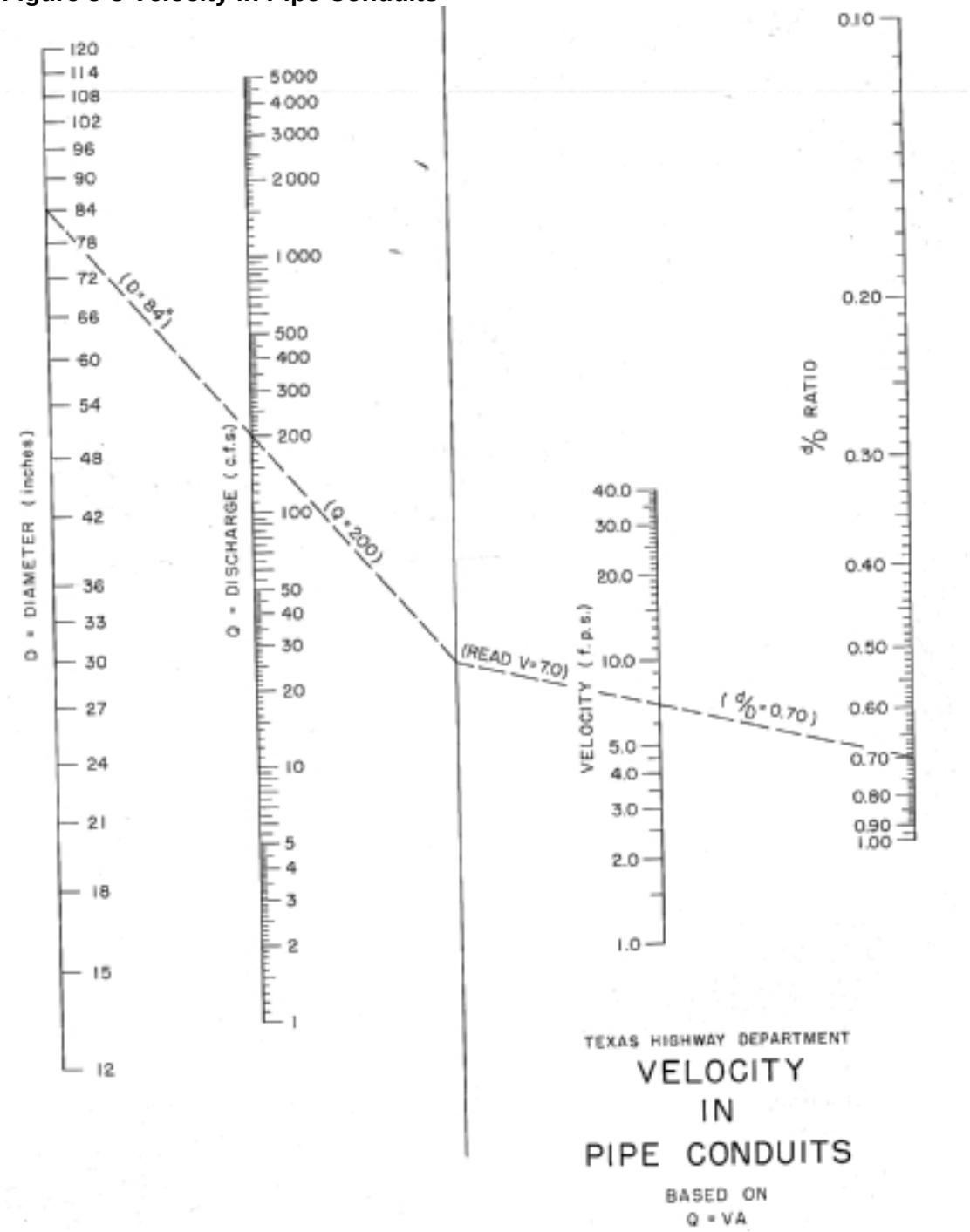
Source: Texas Highway Department, Bridge Division

Figure 5-2 Critical Depth of Flow for Circular Conduits



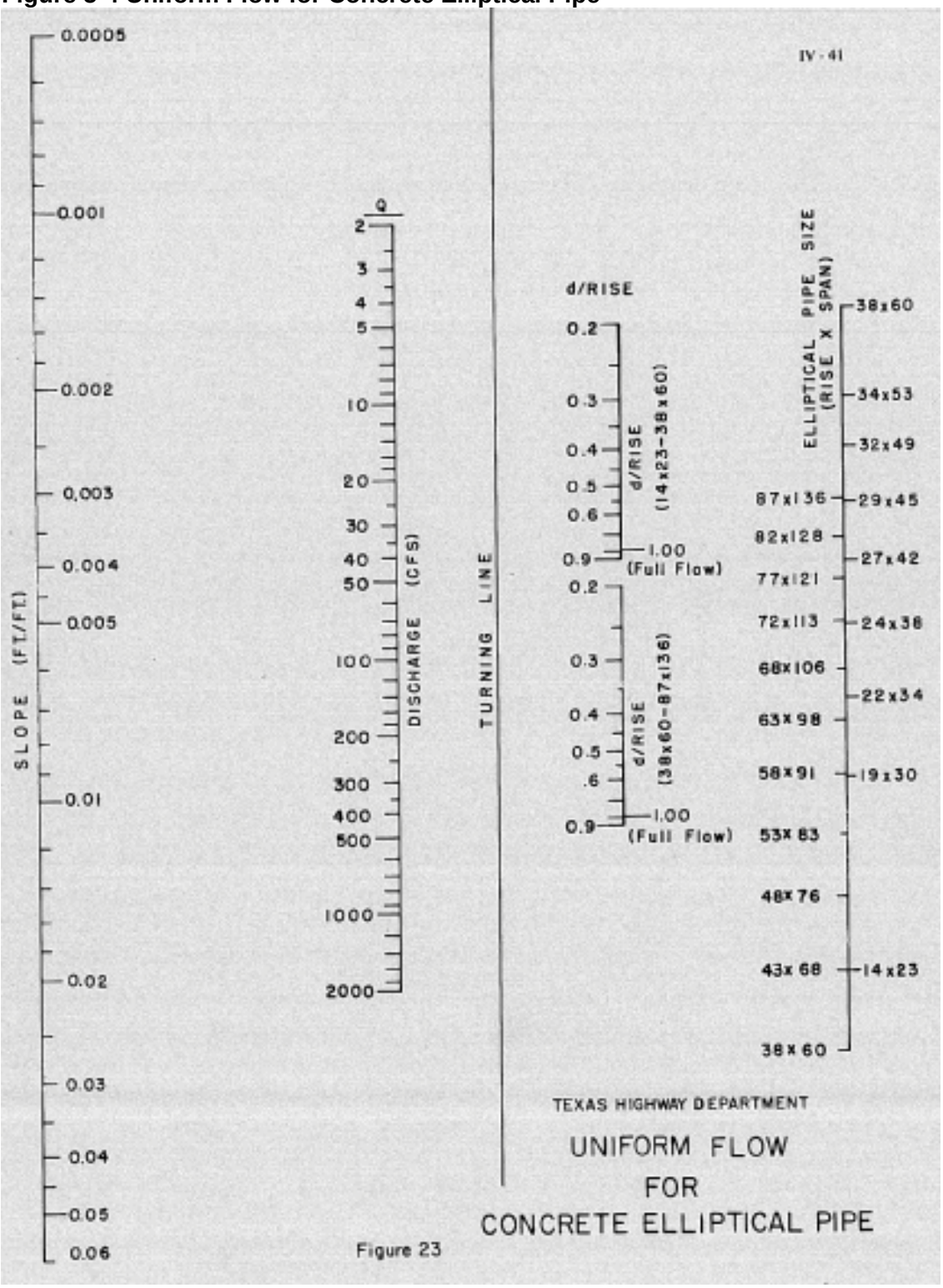
Source: Texas Highway Department, Bridge Division

Figure 5-3 Velocity in Pipe Conduits



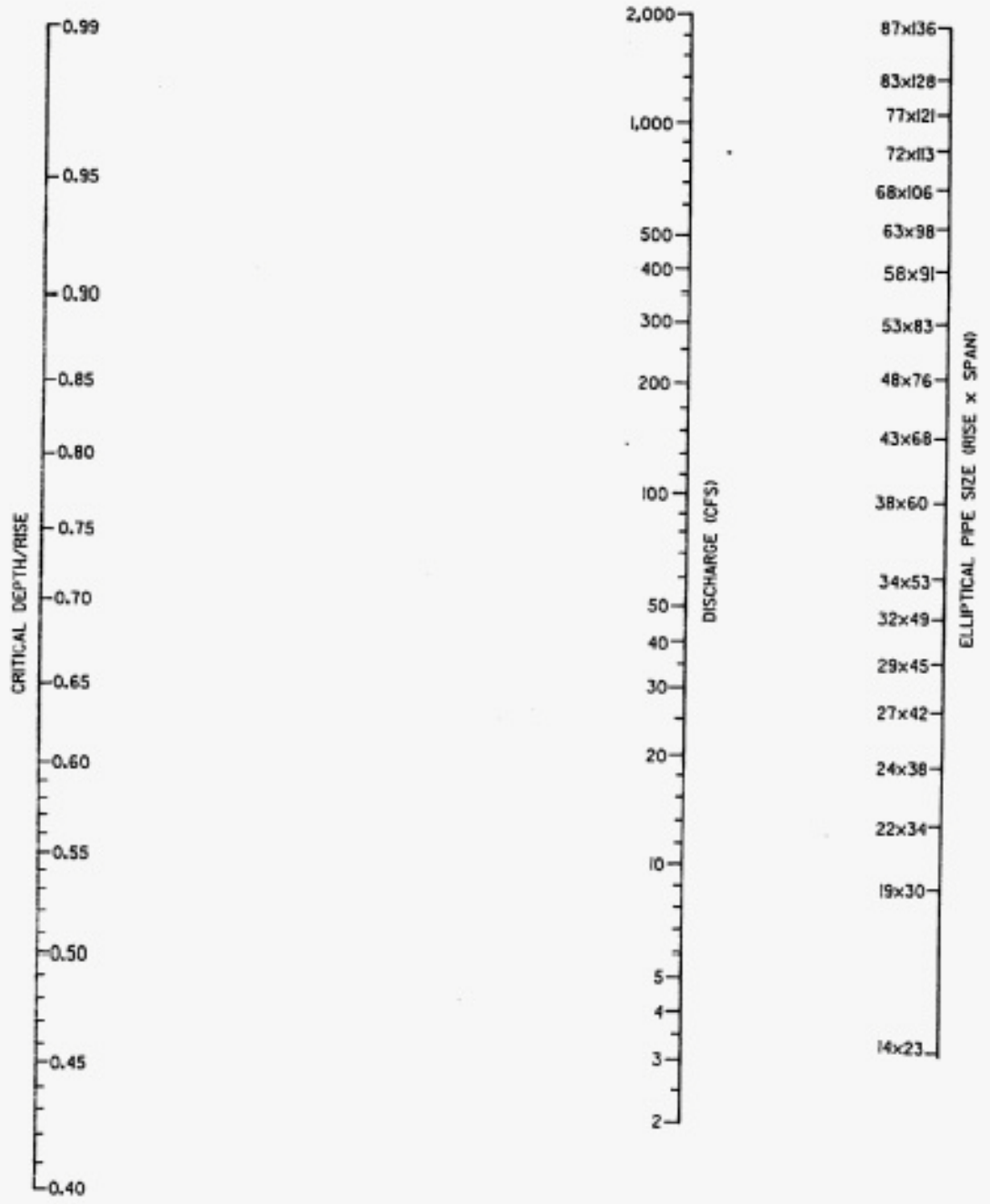
Source: Texas Highway Department, Bridge Division

Figure 5-4 Uniform Flow for Concrete Elliptical Pipe



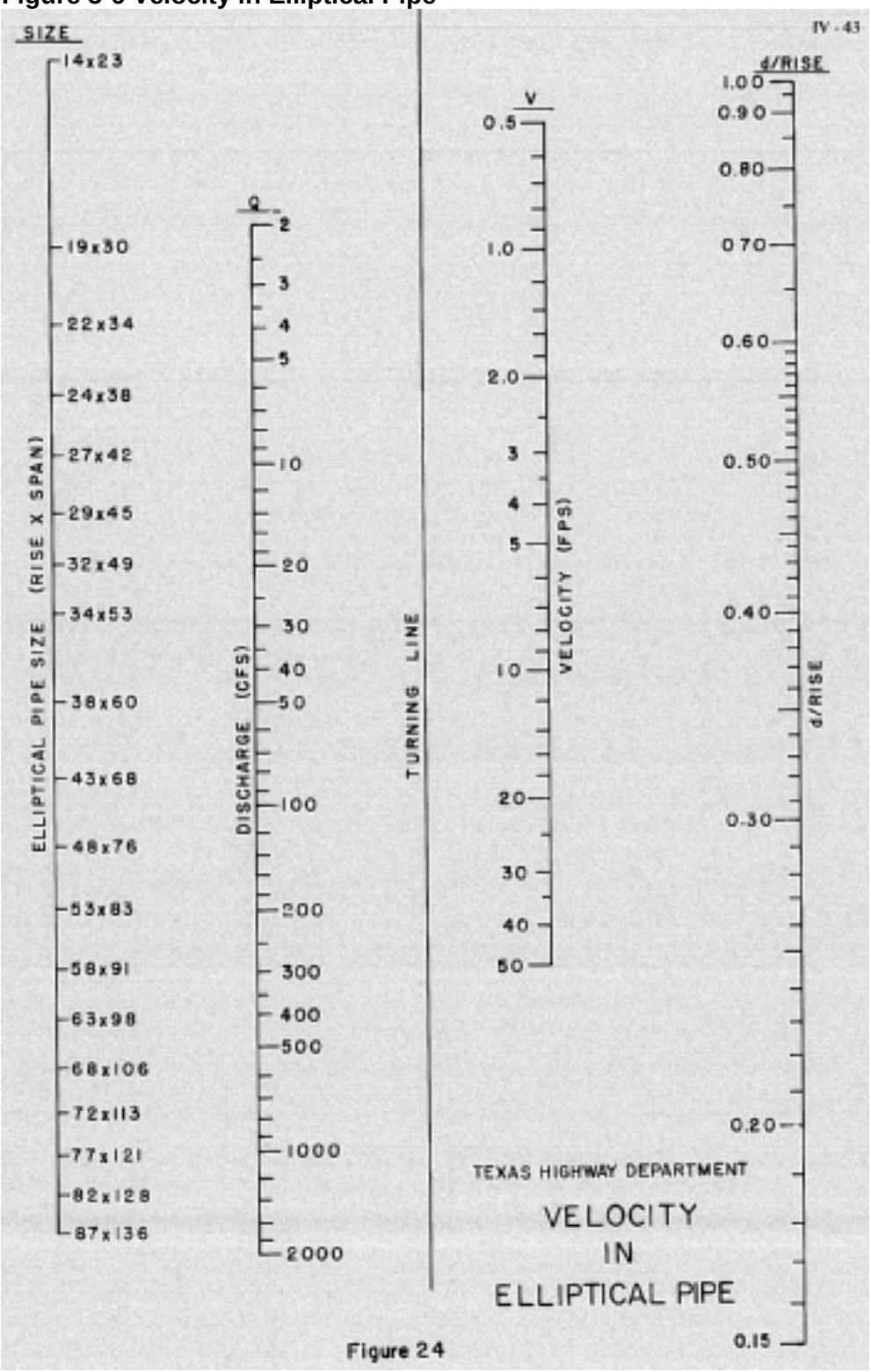
Source: Texas Highway Department, Bridge Division

Figure 5-5 Critical Depth for Elliptical Pipe



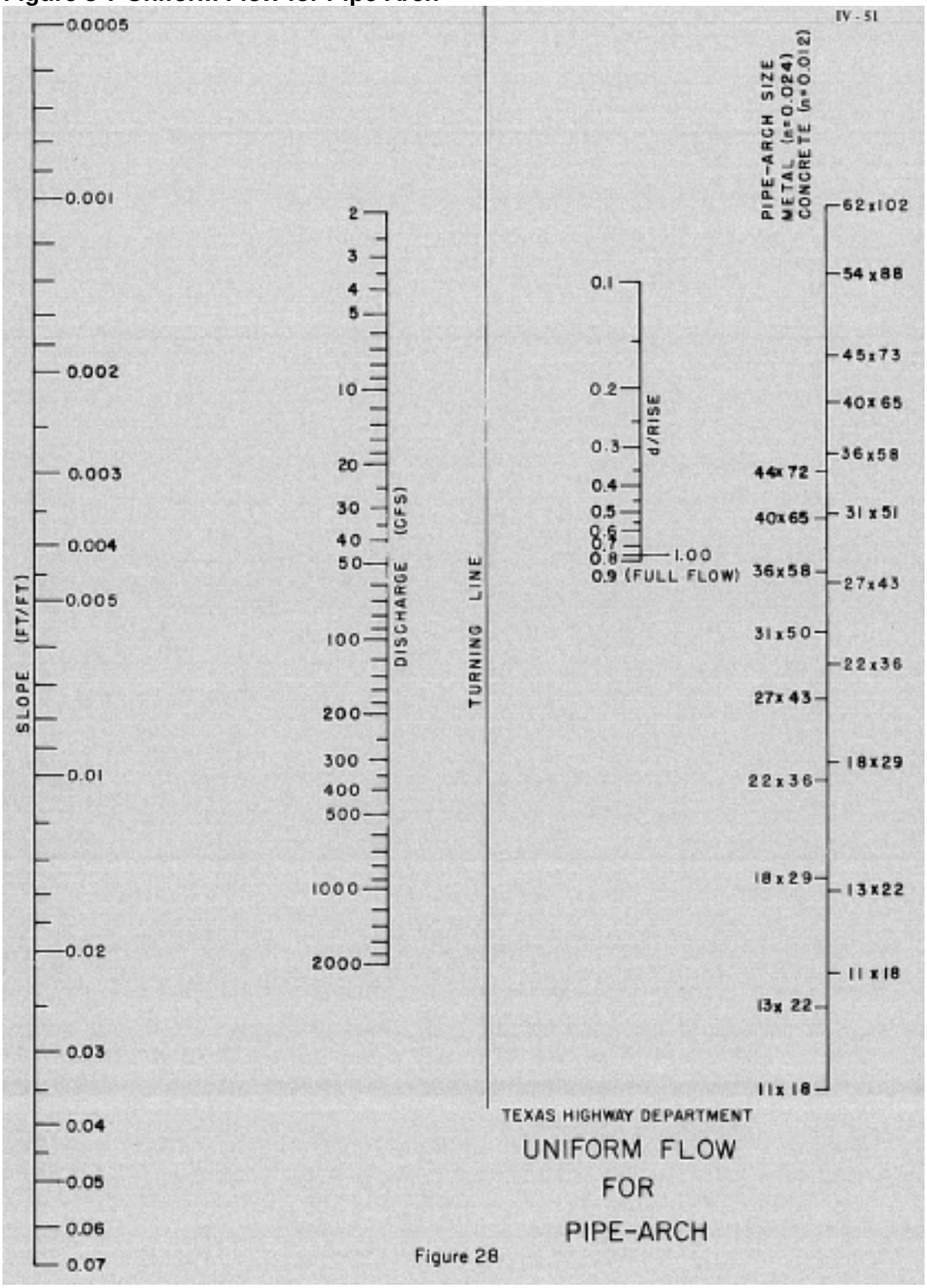
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 5-6 Velocity in Elliptical Pipe



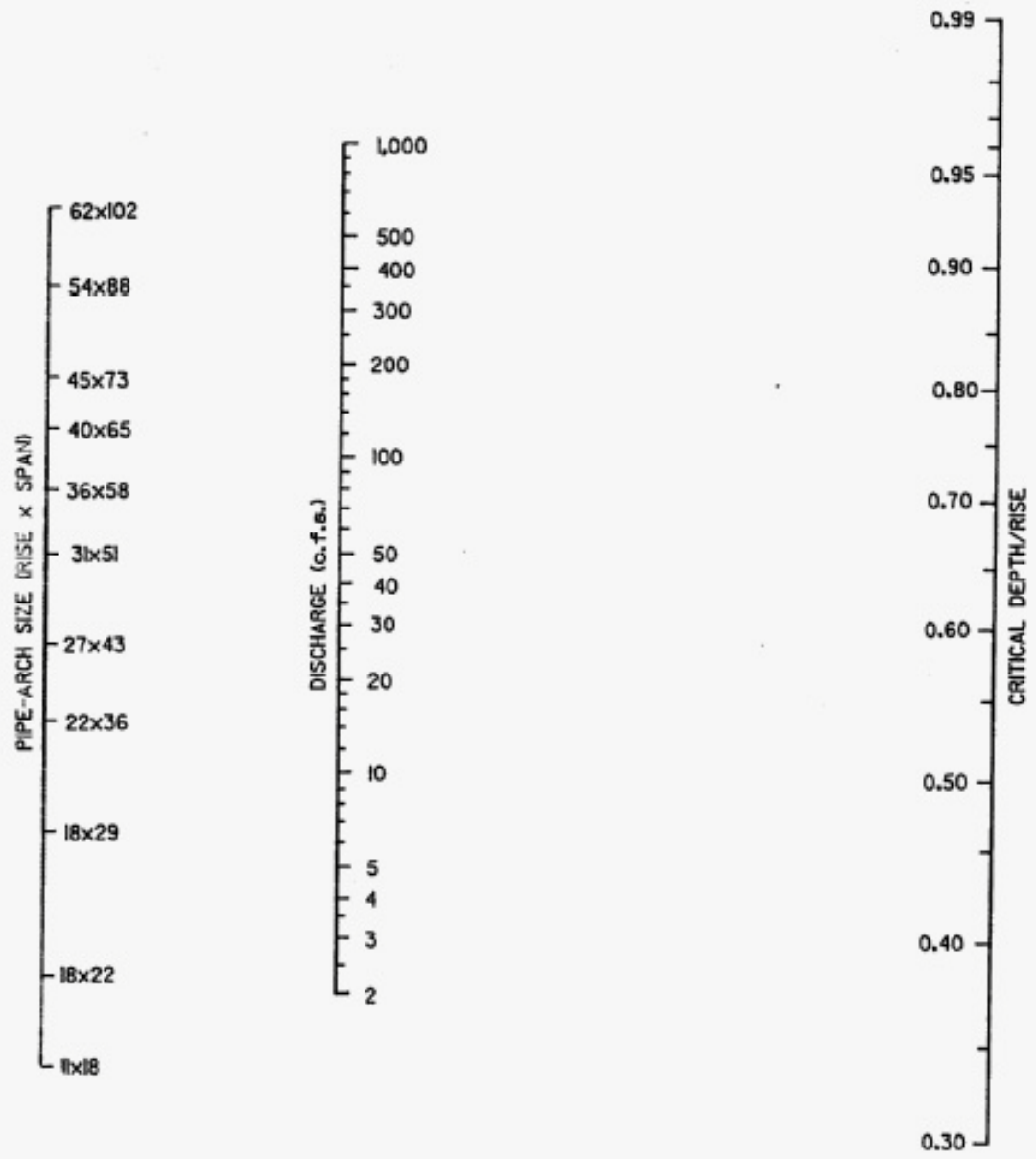
Source: Texas Highway Department, Bridge Division

Figure 5-7 Uniform Flow for Pipe Arch



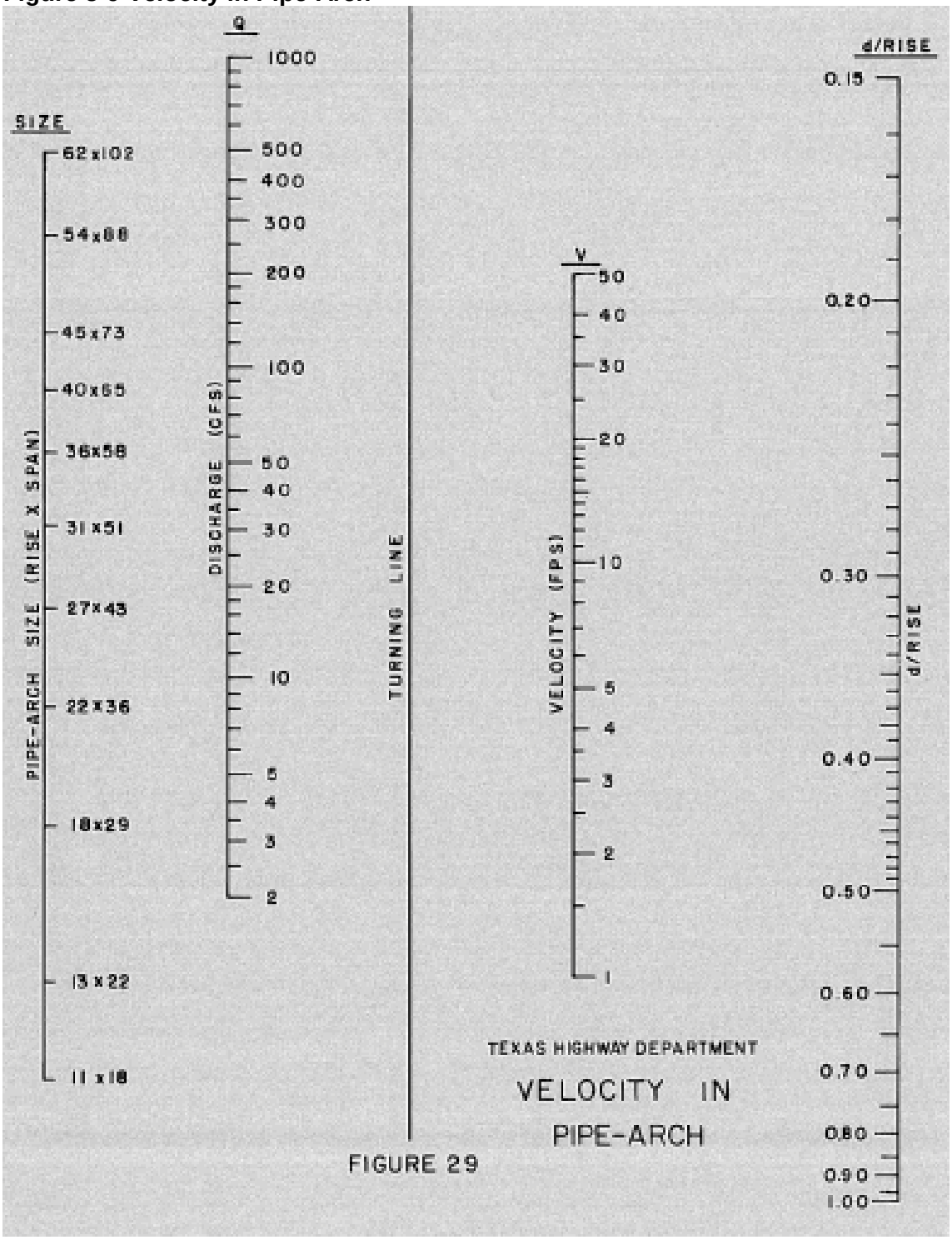
Source: Texas Highway Department, Bridge Division

Figure 5-8 Depth of Flow for Pipe-Arch



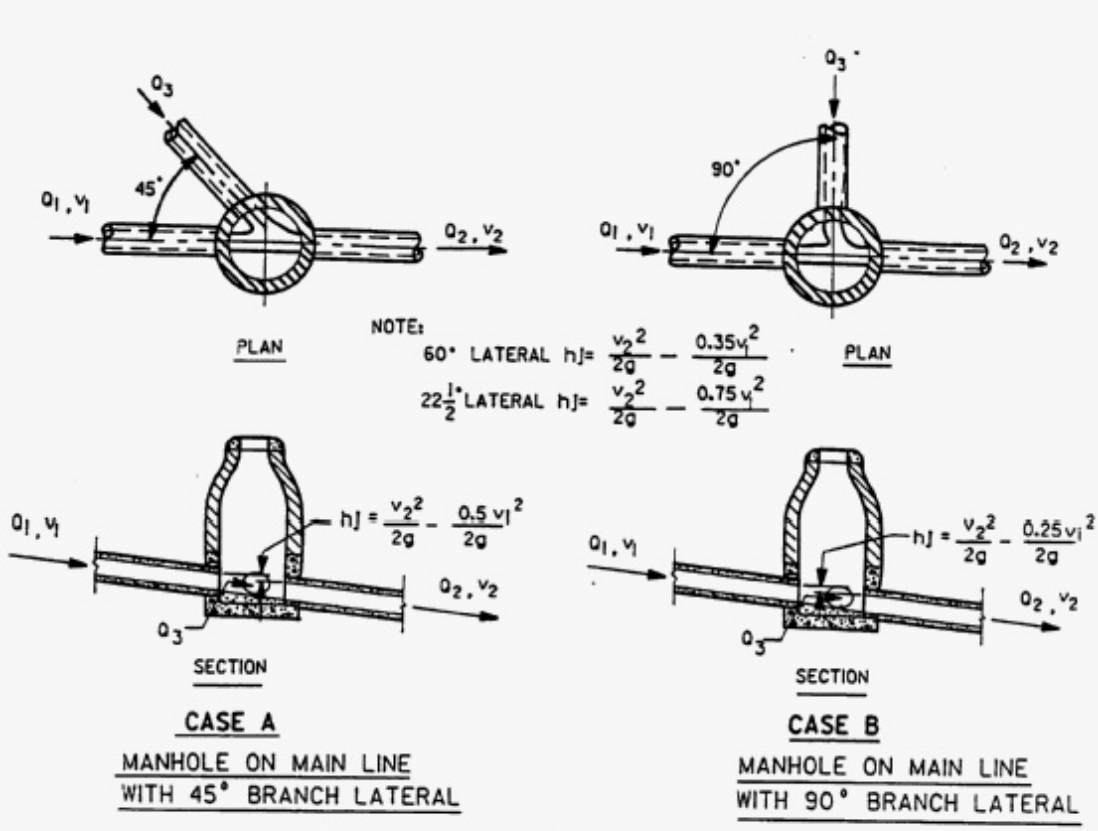
Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 5-9 Velocity in Pipe-Arch



Source: Texas Highway Department, Bridge Division

Figure 5-10 Minor Head Losses Due to Turbulence at Structures



Source: City of Austin. Drainage Criteria Manual. Department of Public Works. Austin, Texas. January 1977.

Figure 5-11 Minor Head Losses Due to Turbulence at Structures

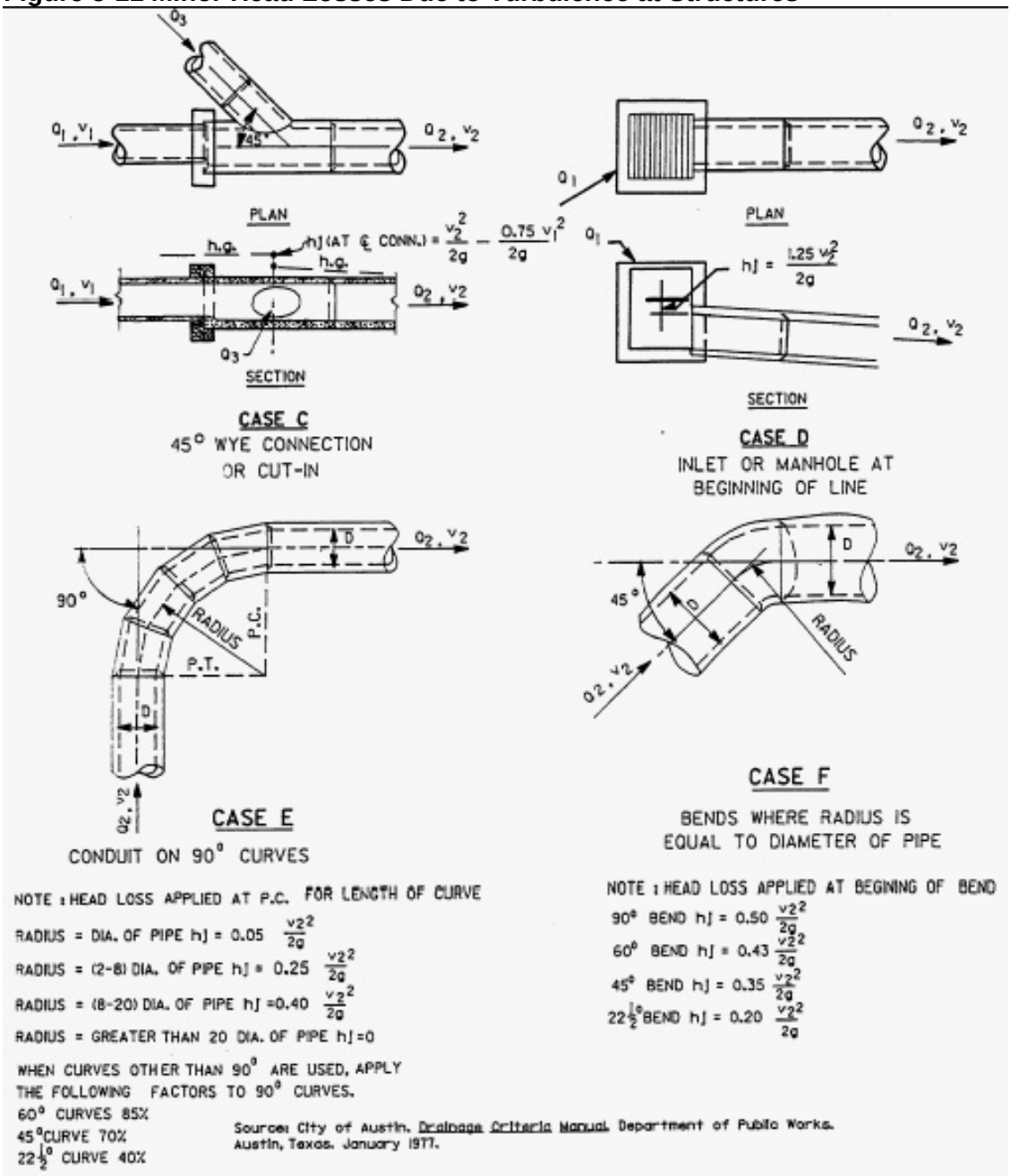
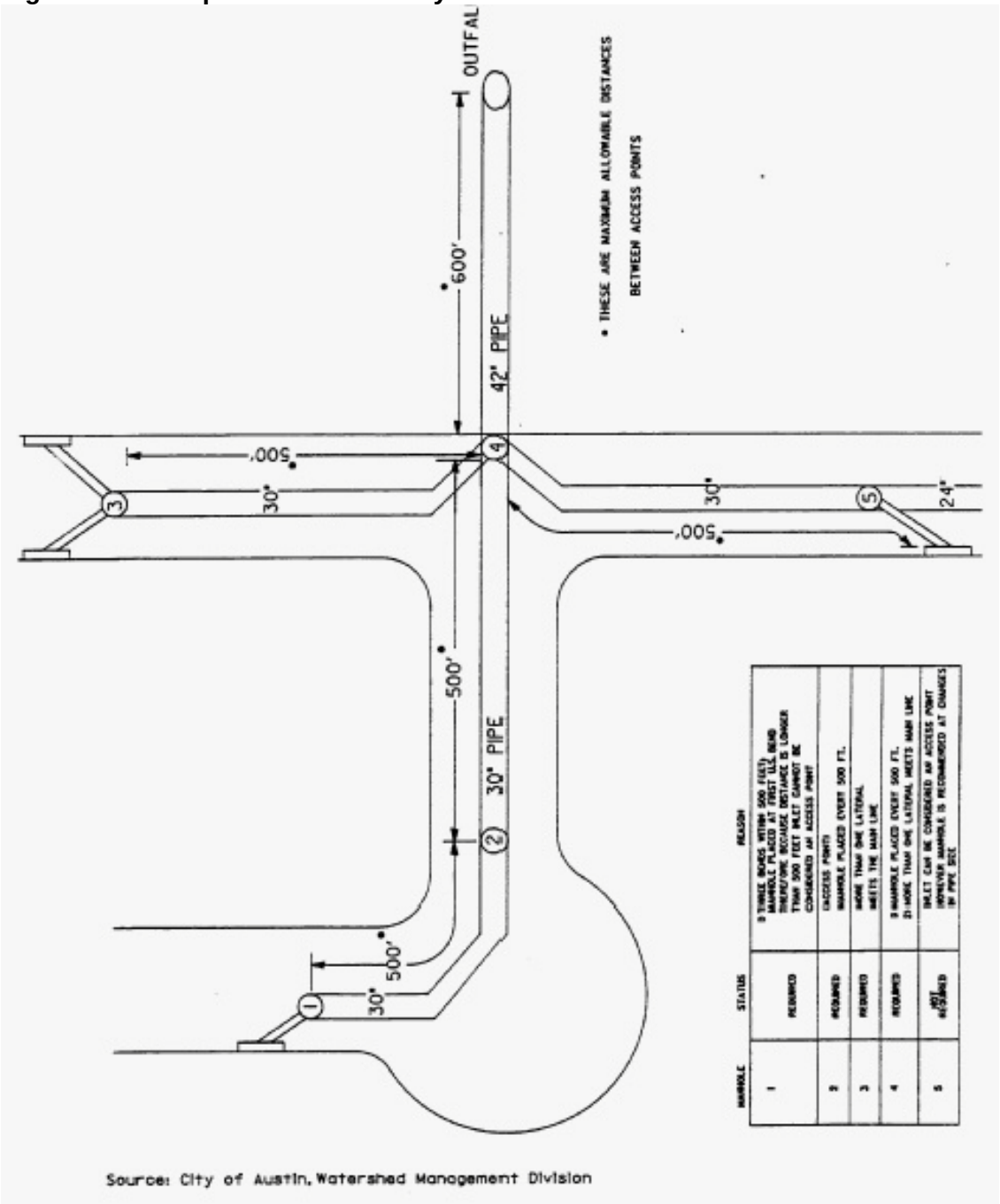
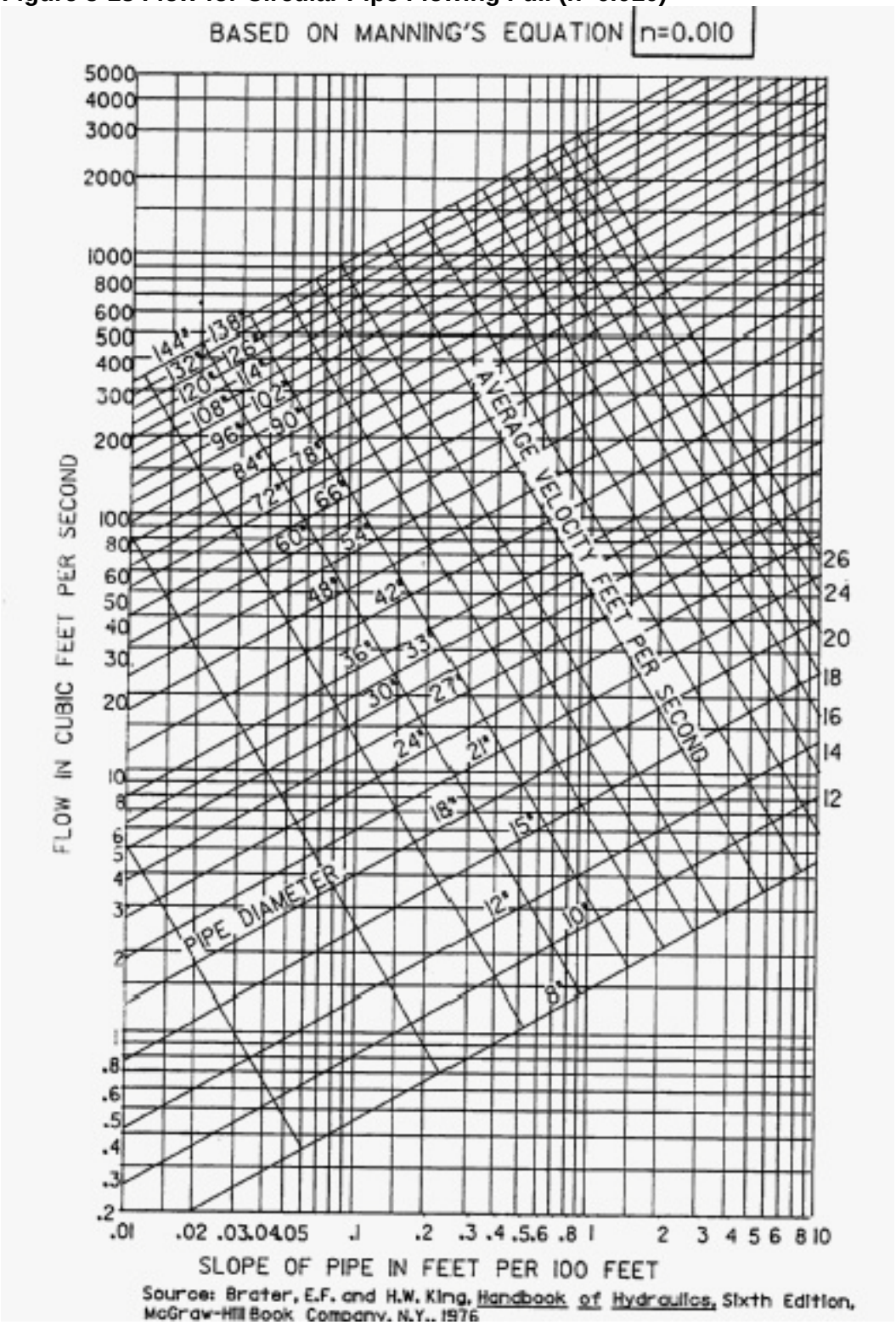


Figure 5-12 Sample Stormsewer Layout



Source: City of Austin, Watershed Management Division

Figure 5-13 Flow for Circular Pipe Flowing Full (n=0.010)



Source: Brater, E.F. and H.W. King, Handbook of Hydraulics, Sixth Edition, McGraw-Hill Book Company, N.Y., 1976

Figure 5-14 Flow for Circular Pipe Flowing Full (n=0.011)

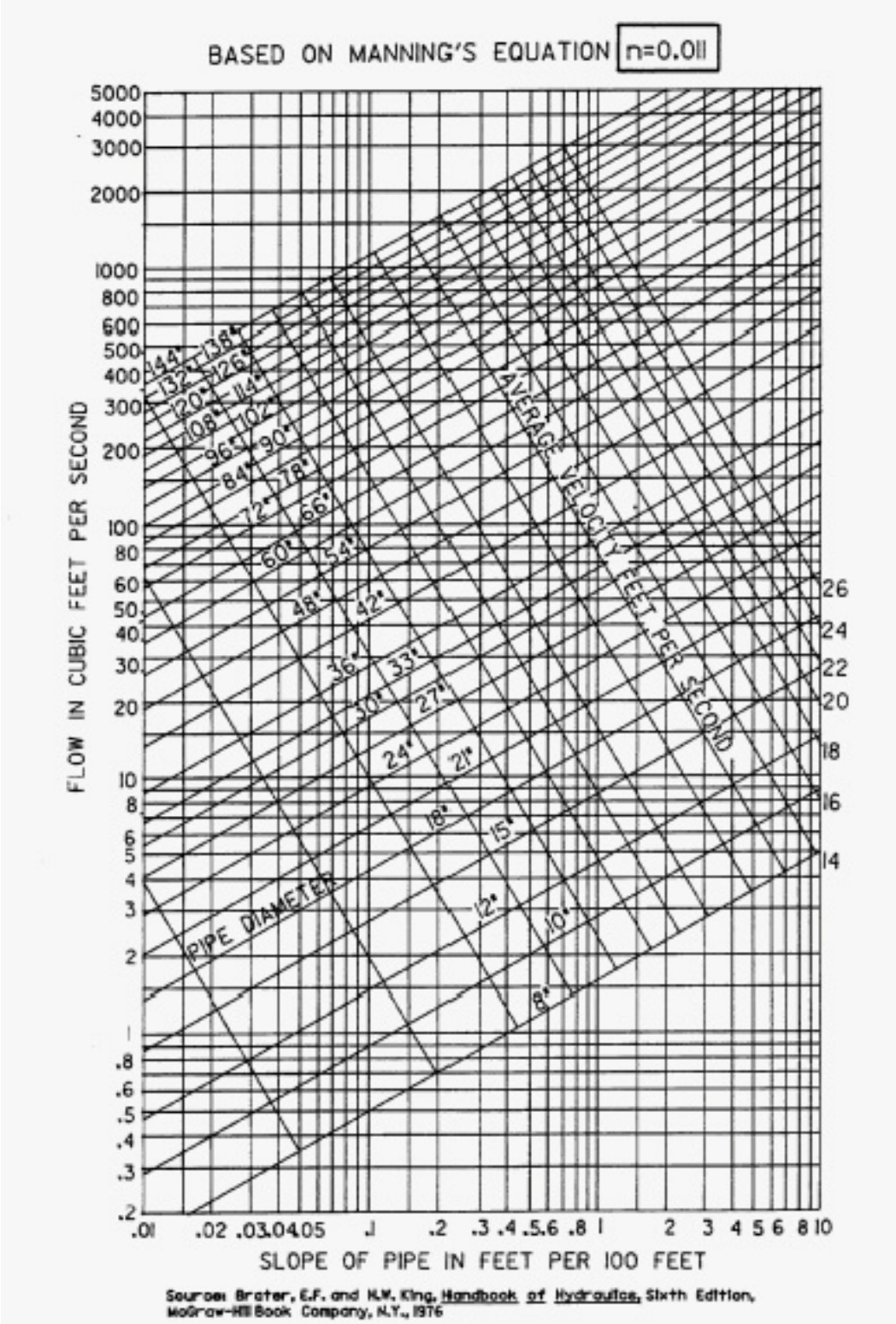


Figure 5-15 Flow for Circular Pipe Flowing Full (n=0.012)

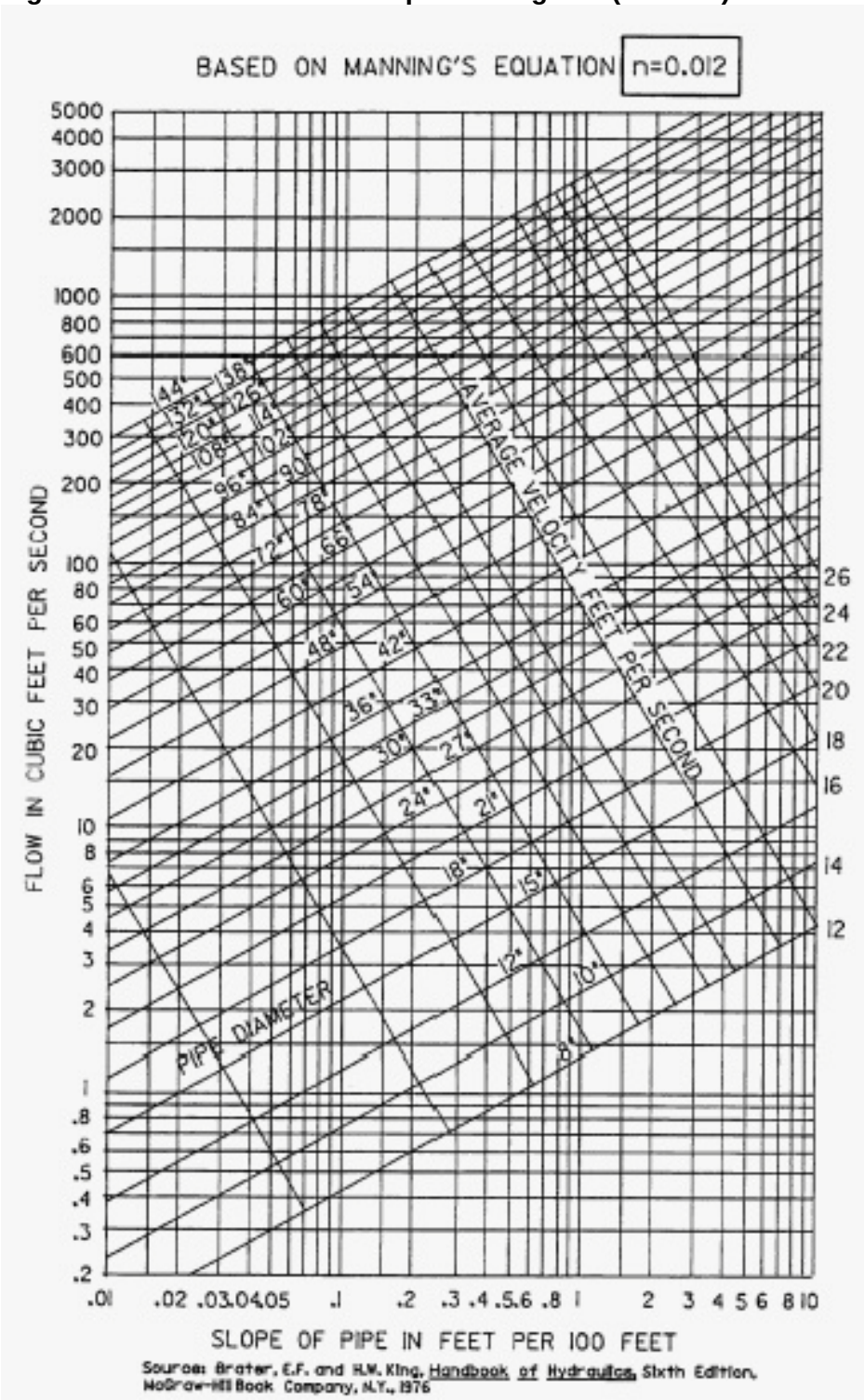
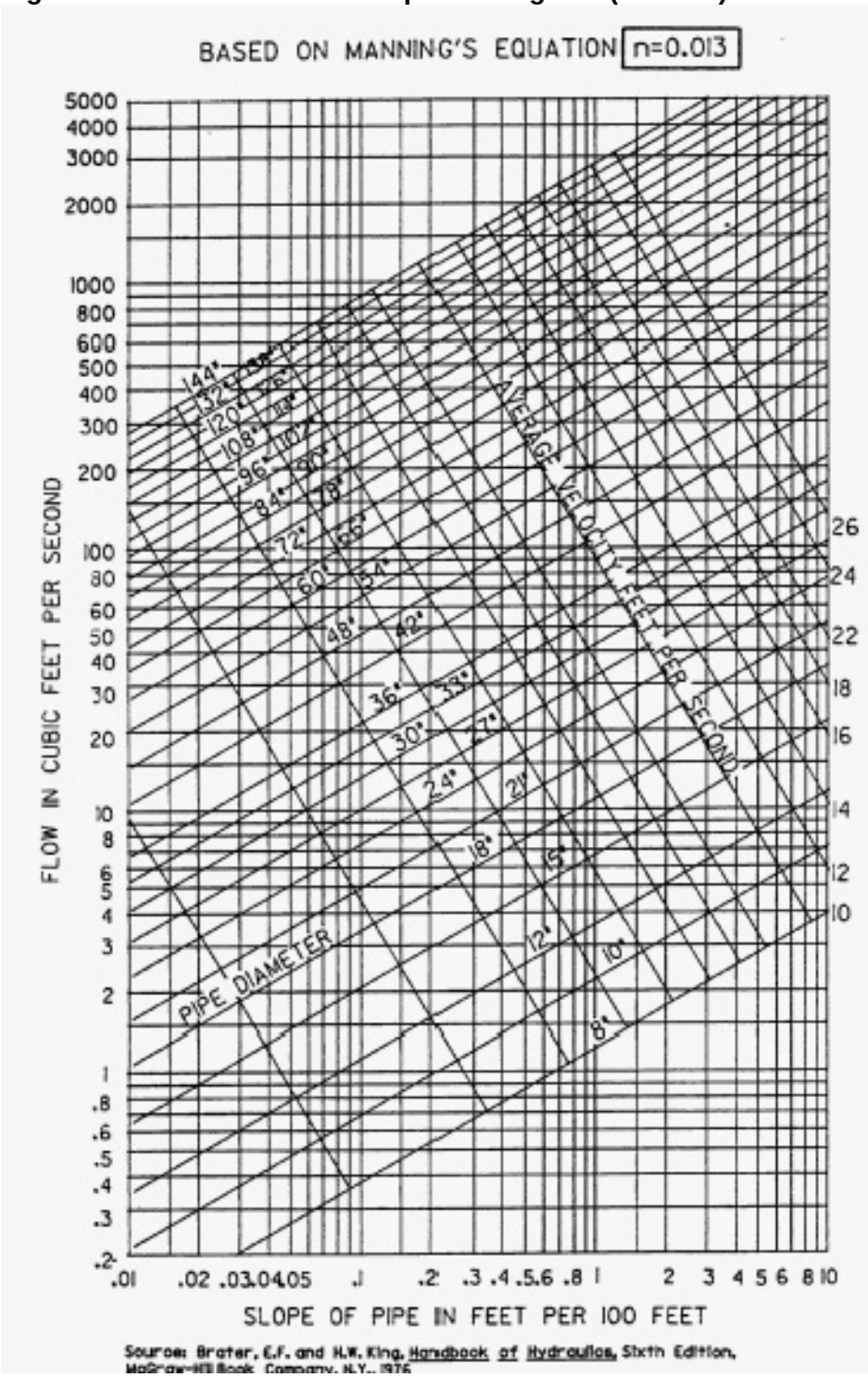
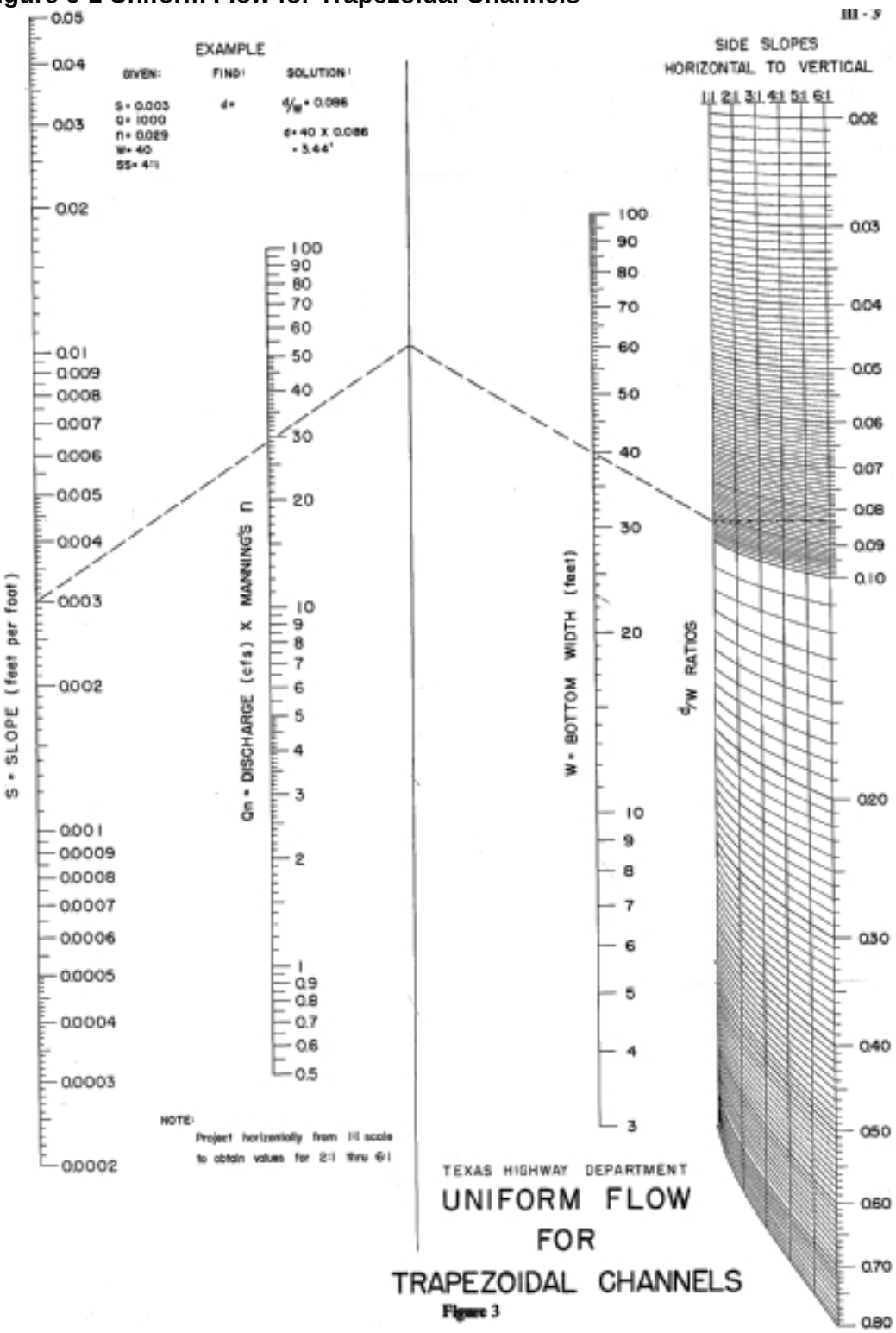


Figure 5-16 Flow for Circular Pipe Flowing Full (n=0.013)



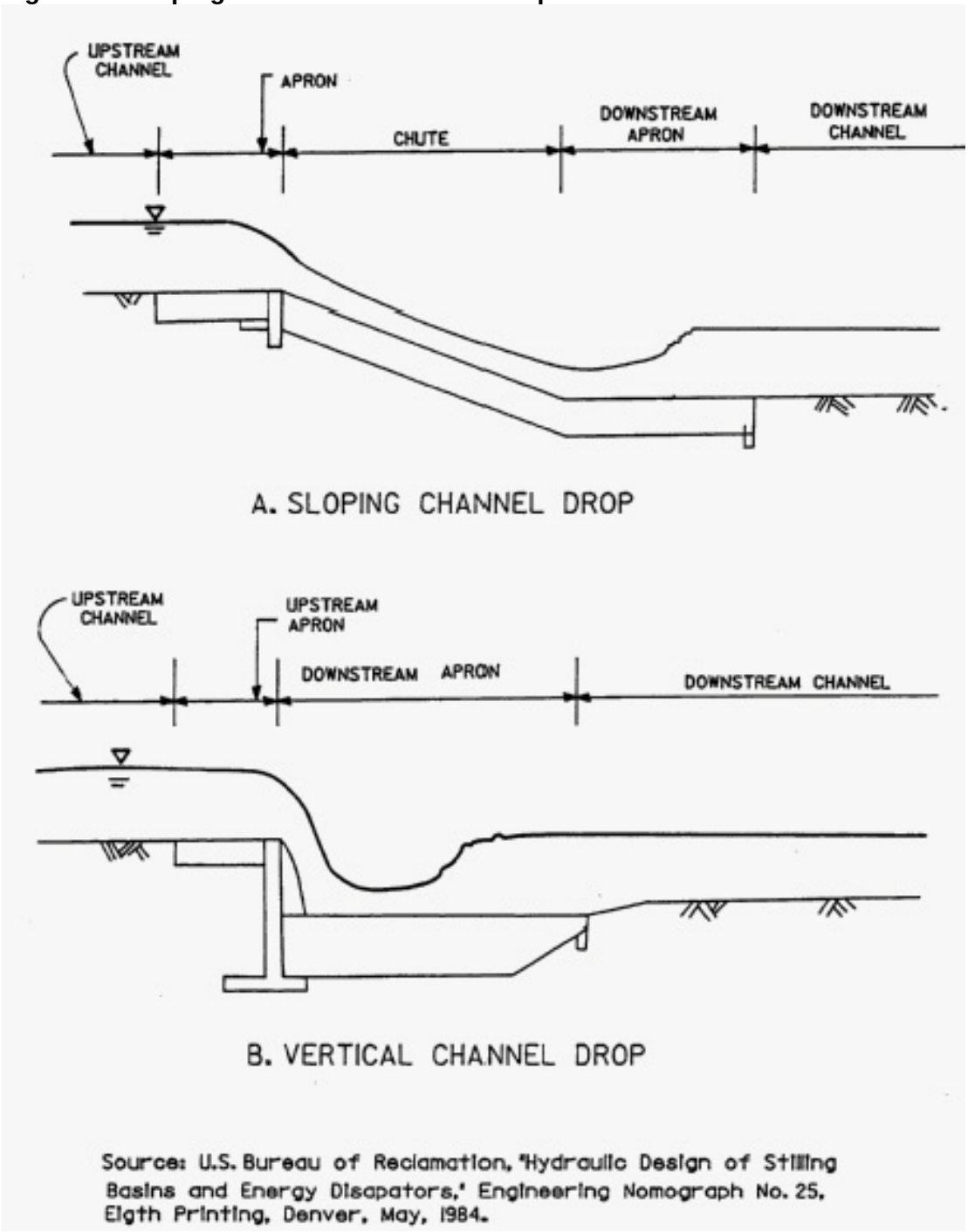
FIGURES FROM SECTION 6

Figure 6-1 Uniform Flow for Trapezoidal Channels



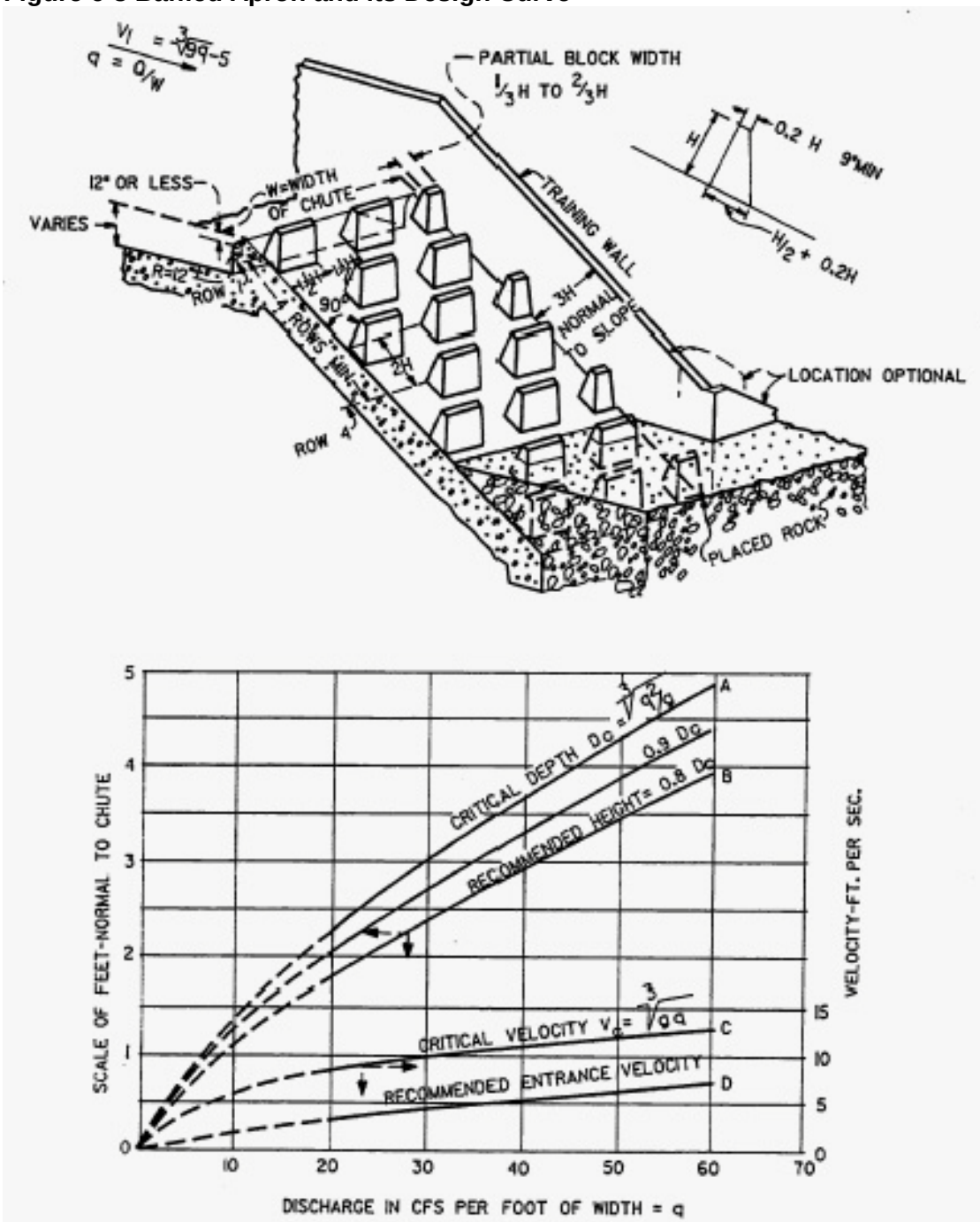
Source: Texas Highway Department, Bridge Division

Figure 6-2 Sloping and Vertical Channel Drops



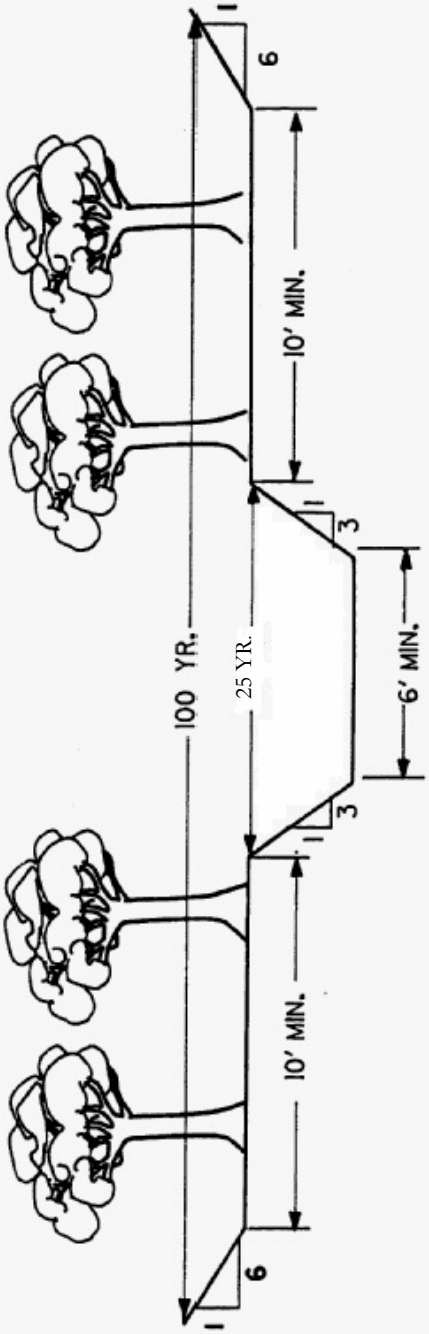
Source: U.S. Bureau of Reclamation, "Hydraulic Design of Stilling Basins and Energy Disapators," Engineering Nomograph No. 25, Eigth Printing, Denver, May, 1984.

Figure 6-3 Baffled Apron and its Design Curve



Source: U.S. Bureau of Reclamation, "Hydraulic Design of Stilling Basins and Energy Dissipators," Engineering Nomograph No. 25, Eigth Printing, Denver, May, 1984.

Figure 6-4 Conceptual Design of Alternative Channel



Source: City of Austin, Department of Environmental Protection

FIGURES FROM SECTION 7

Figure 7-1 Headwall Entrance Type

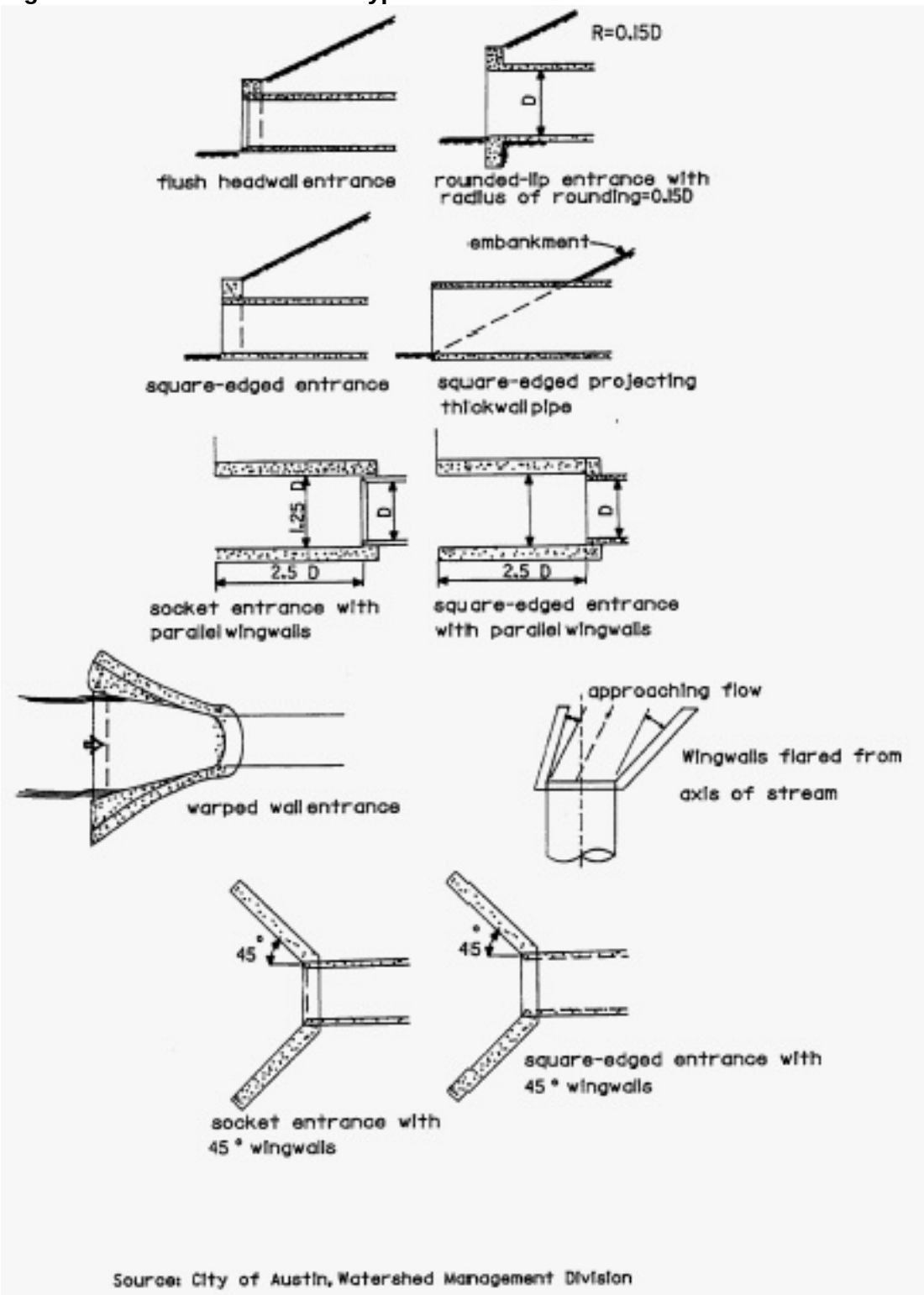


Figure 7-2 Conceptual Design of Debris Fins

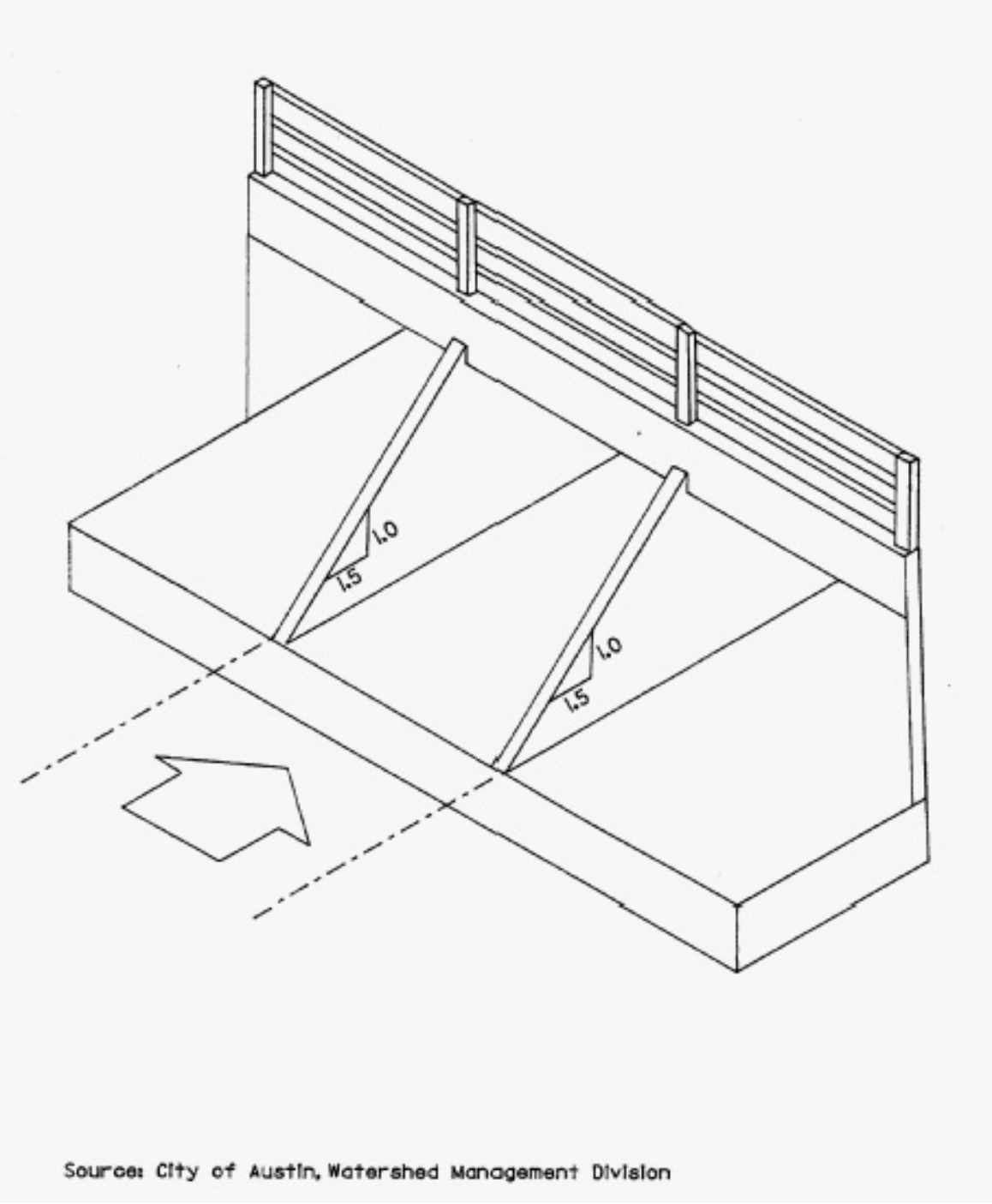
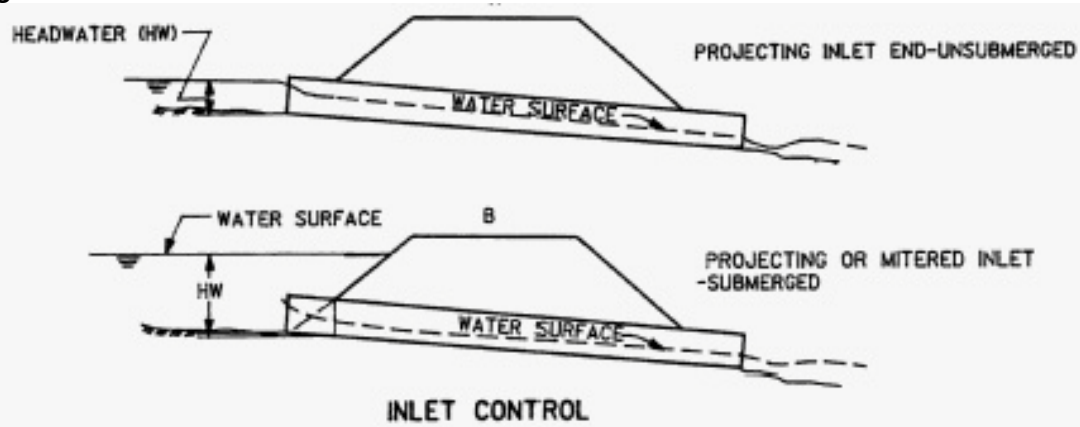
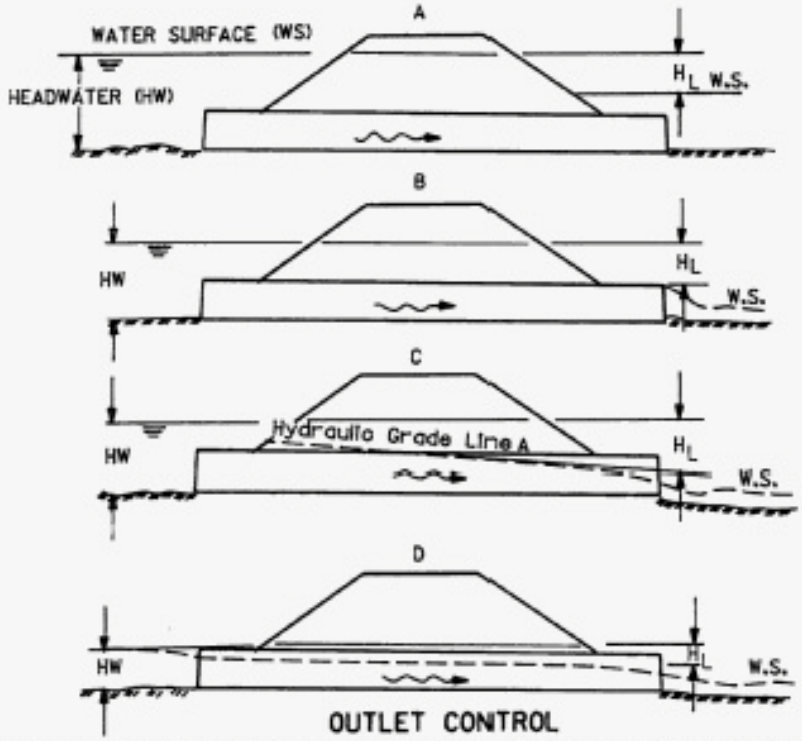


Figure 7-3 Inlet and Outlet Conditions for Culverts



INLET CONTROL

INLET CONTROL IS ONE OF THE TWO MAJOR TYPES OF CULVERT FLOW. CONDITION A WITH AN UNSUBMERGED CULVERT INLET IS PREFERRED TO THE SUBMERGED END. SLOPE, ROUGHNESS AND LENGTH OF CULVERT BARREL ARE NOT A CONSIDERATION.

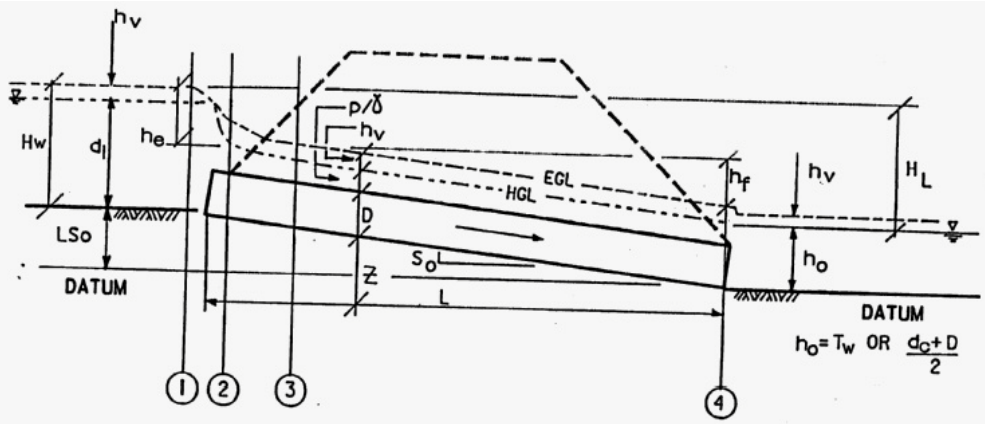


OUTLET CONTROL

OUTLET CONTROL INVOLVES THESE FACTORS: CROSS-SECTIONAL AREA OF BARREL, INLET 'GEOMETRY', PONDING, SLOPE, ROUGHNESS, TAILWATER, AND LENGTH OF CULVERT BARREL.

Source: Boulder County, Storm Drainage Criteria Manual

Figure 7-4 Hydraulics of a Culvert Under Outlet Control Condition



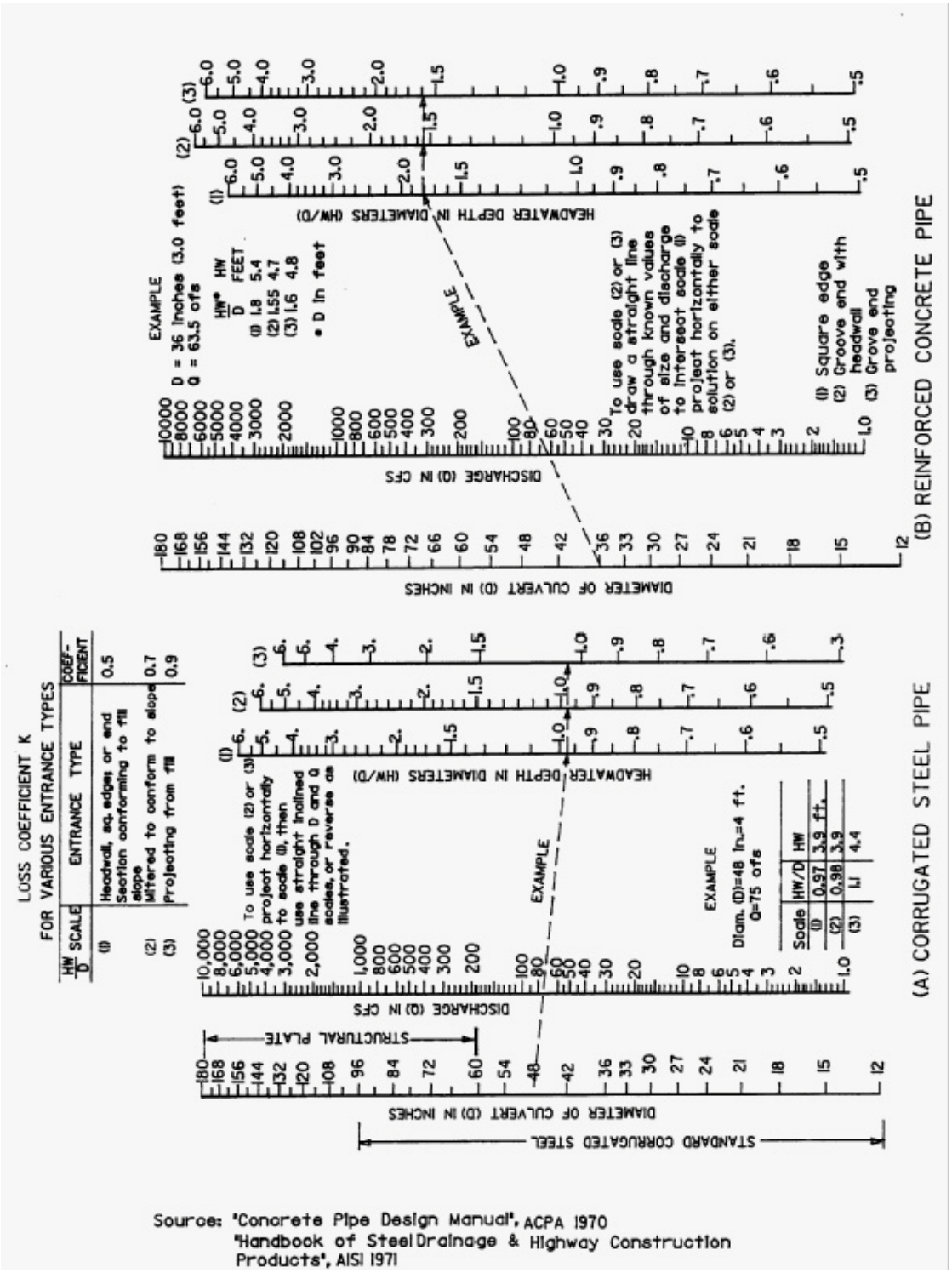
DEFINITION OF TERMS:

L = CULVERT LENGTH
S_o = CULVERT SLOPE
H_w = HEADWATER DEPTH
h_v = VELOCITY HEAD
h_e = HEADLOSS AT THE ENTRANCE
Z = DISTANCE FROM DATUM LINE
D = CULVERT DIAMETER OR RISE

P/γ = PRESSURE HEAD
HGL = HYDRAULIC GRADE LINE
EGL = ENERGY GRADE LINE
T_w = TAILWATER DEPTH
hf = FRICTION LOSS IN CULVERT
d_1 = APPROACH DEPTH

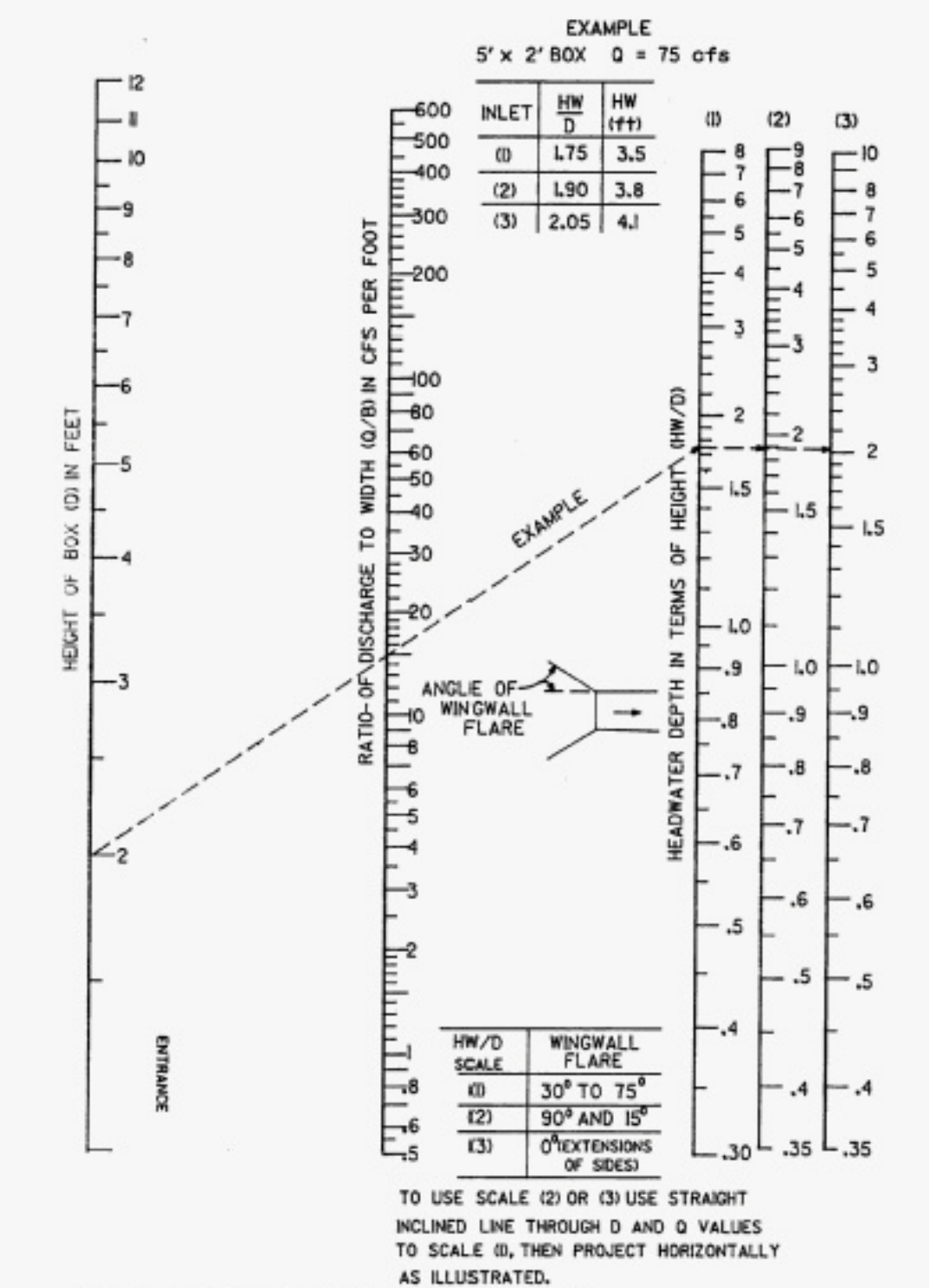
Source: Boulder County, Storm Drainage Criteria Manual

Figure 7-5 Inlet Control Nomograph, Circular Pipe



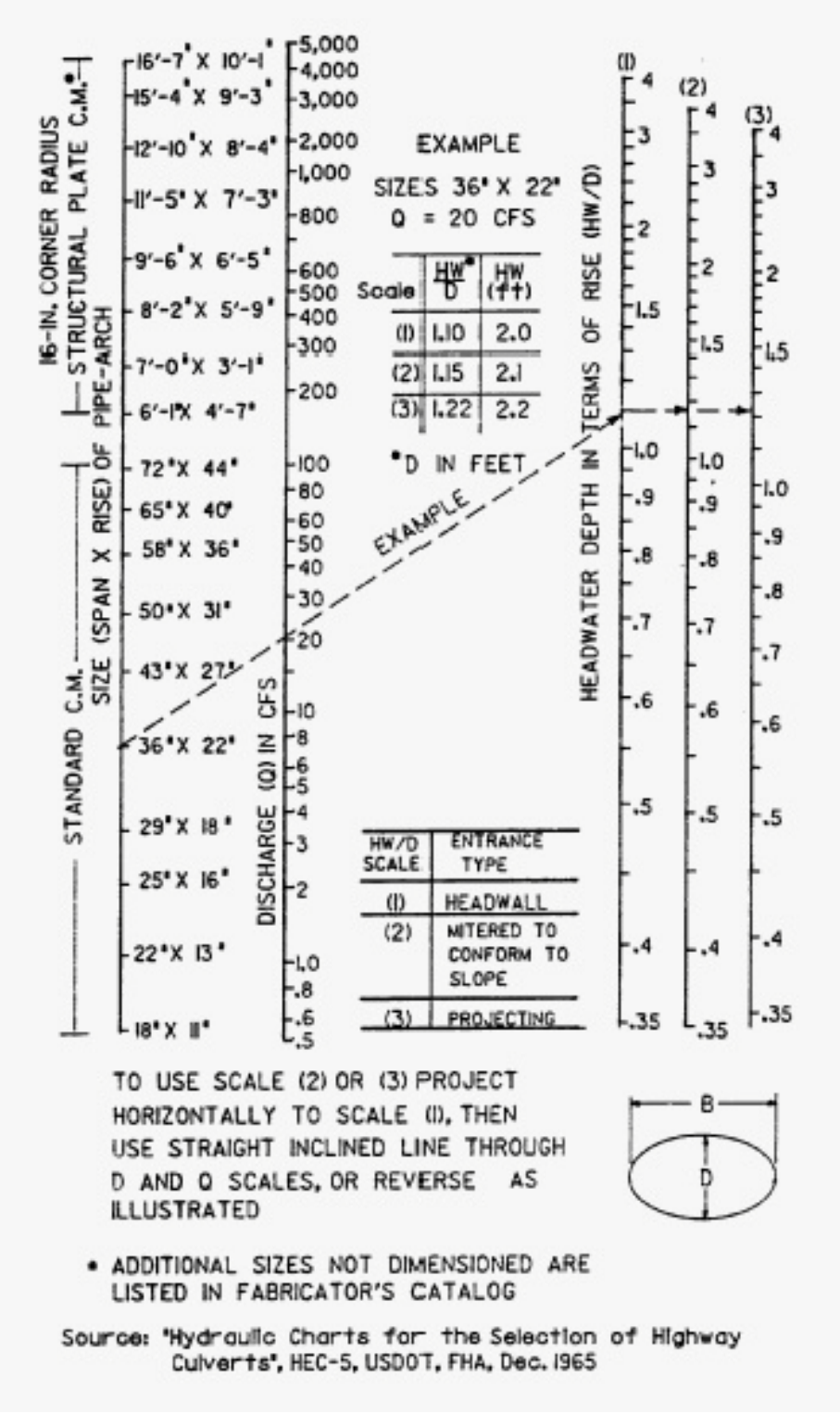
Source: 'Concrete Pipe Design Manual', ACPA 1970
'Handbook of Steel Drainage & Highway Construction Products', AISI 1971

Figure 7-6 Inlet Control Nomograph, Box Culverts



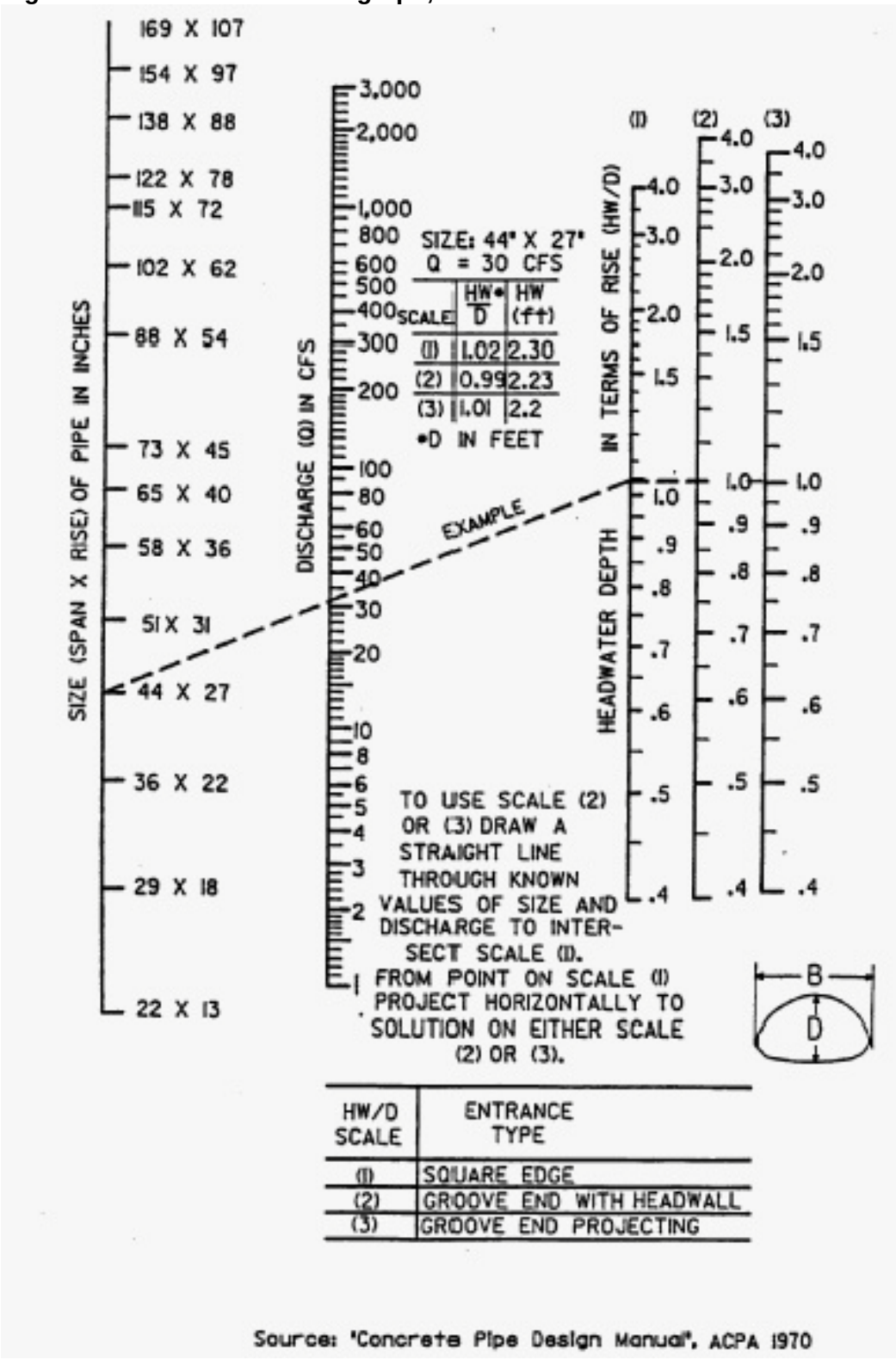
Source: "Hydraulic Charts for the Selection of Highway Culverts", HEC-5, USDOT, FHA, Dec. 1965

Figure 7-7 Inlet Control Nomograph, CSP Arch



Source: "Hydraulic Charts for the Selection of Highway Culverts", HEC-5, USDOT, FHA, Dec. 1965

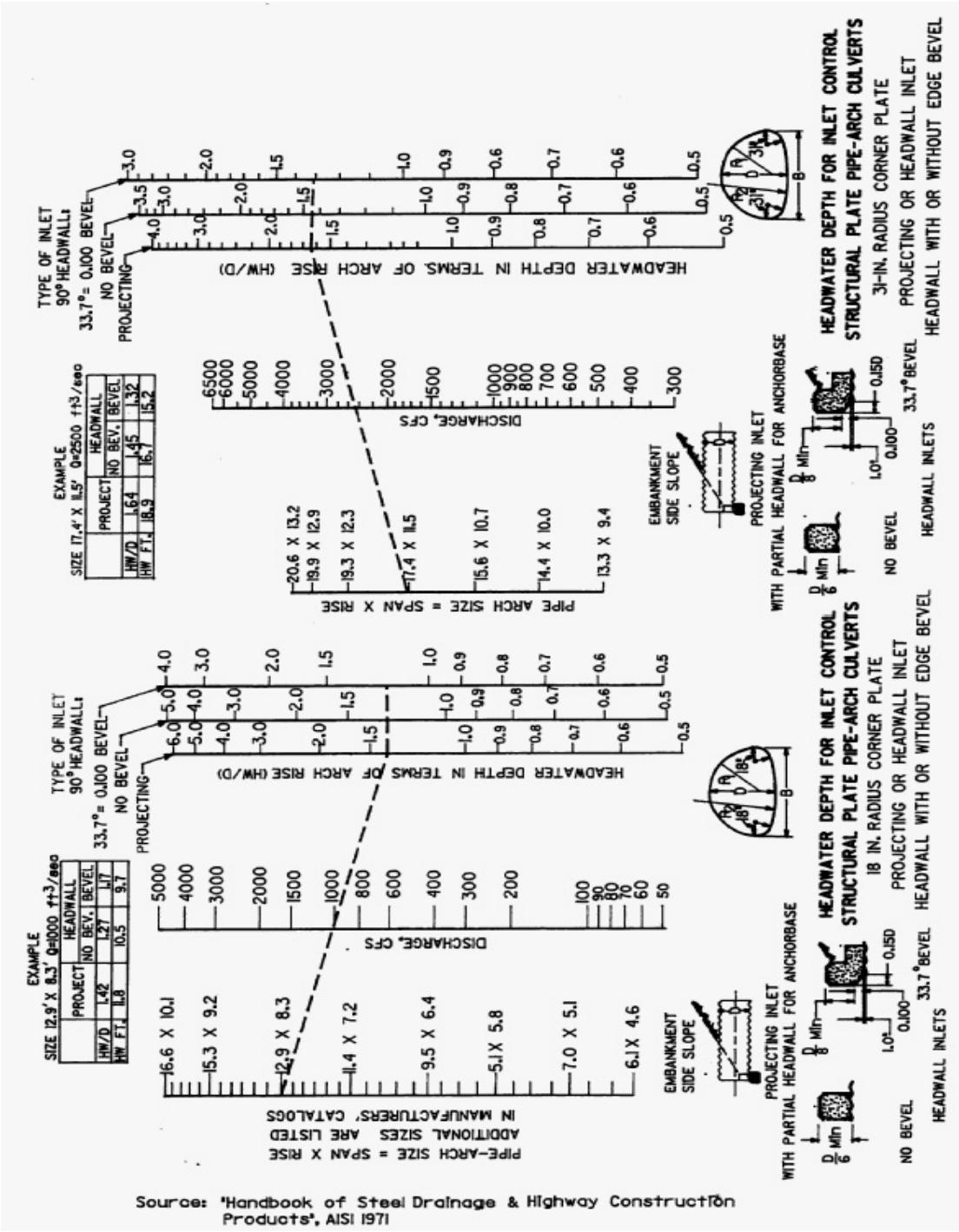
Figure 7-8 Inlet Control Nomograph, RCP Arch



HW/D SCALE	ENTRANCE TYPE
(1)	SQUARE EDGE
(2)	GROOVE END WITH HEADWALL
(3)	GROOVE END PROJECTING

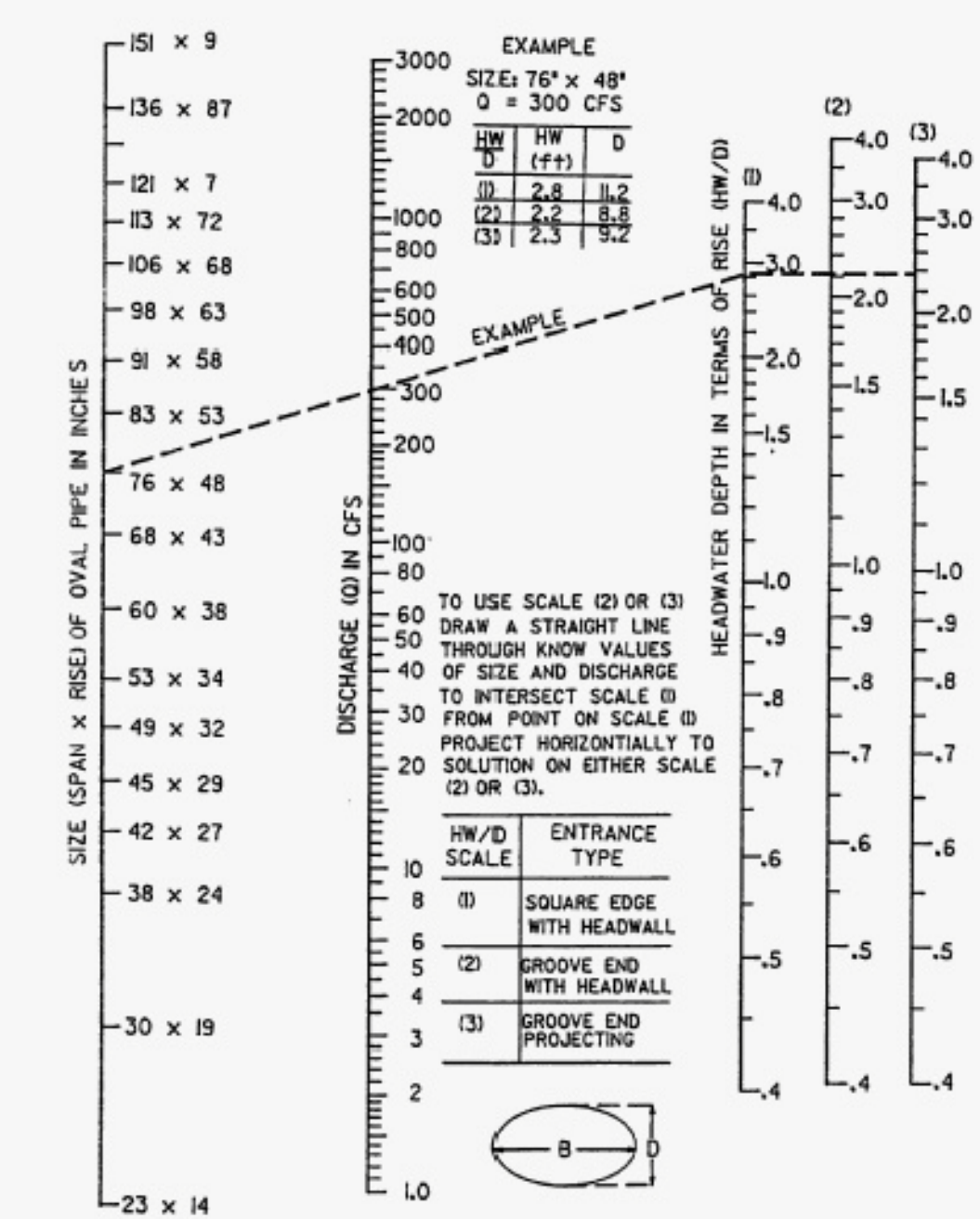
Source: "Concrete Pipe Design Manual", ACPA 1970

Figure 7-9 Inlet Control Nomograph, SSP Arch



Source: "Handbook of Steel Drainage & Highway Construction Products", AISI 1971

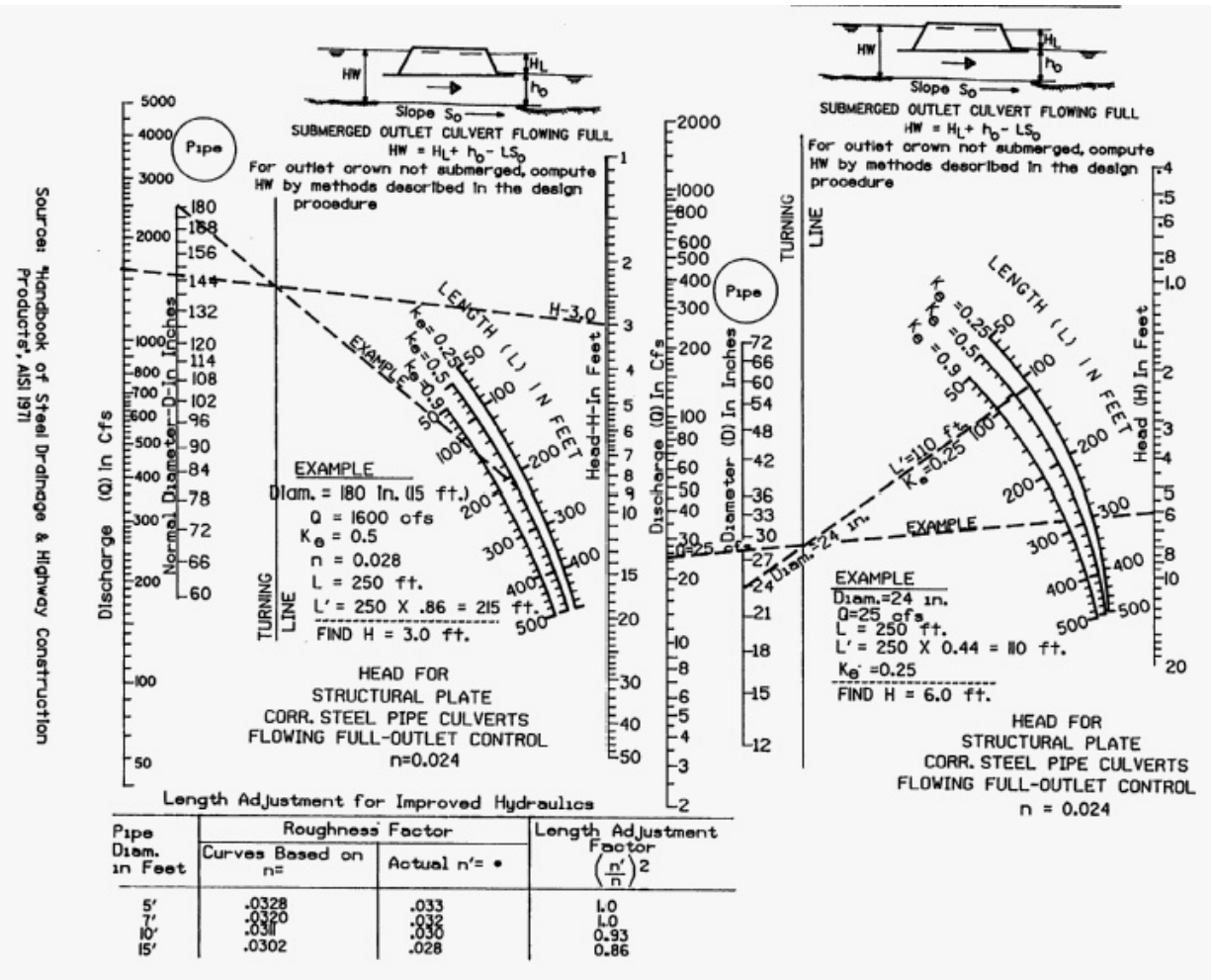
Figure 7-10 Inlet Control Nomograph, RCP Elipse



Source: 'Hydraulic Charts for the Selection of Highway Culverts', HEC-5, USDOT, FHA Dec. 1965

INLET CONTROL NOMOGRAPH

Figure 7-11 Outlet Control Nomograph, Circular CSP

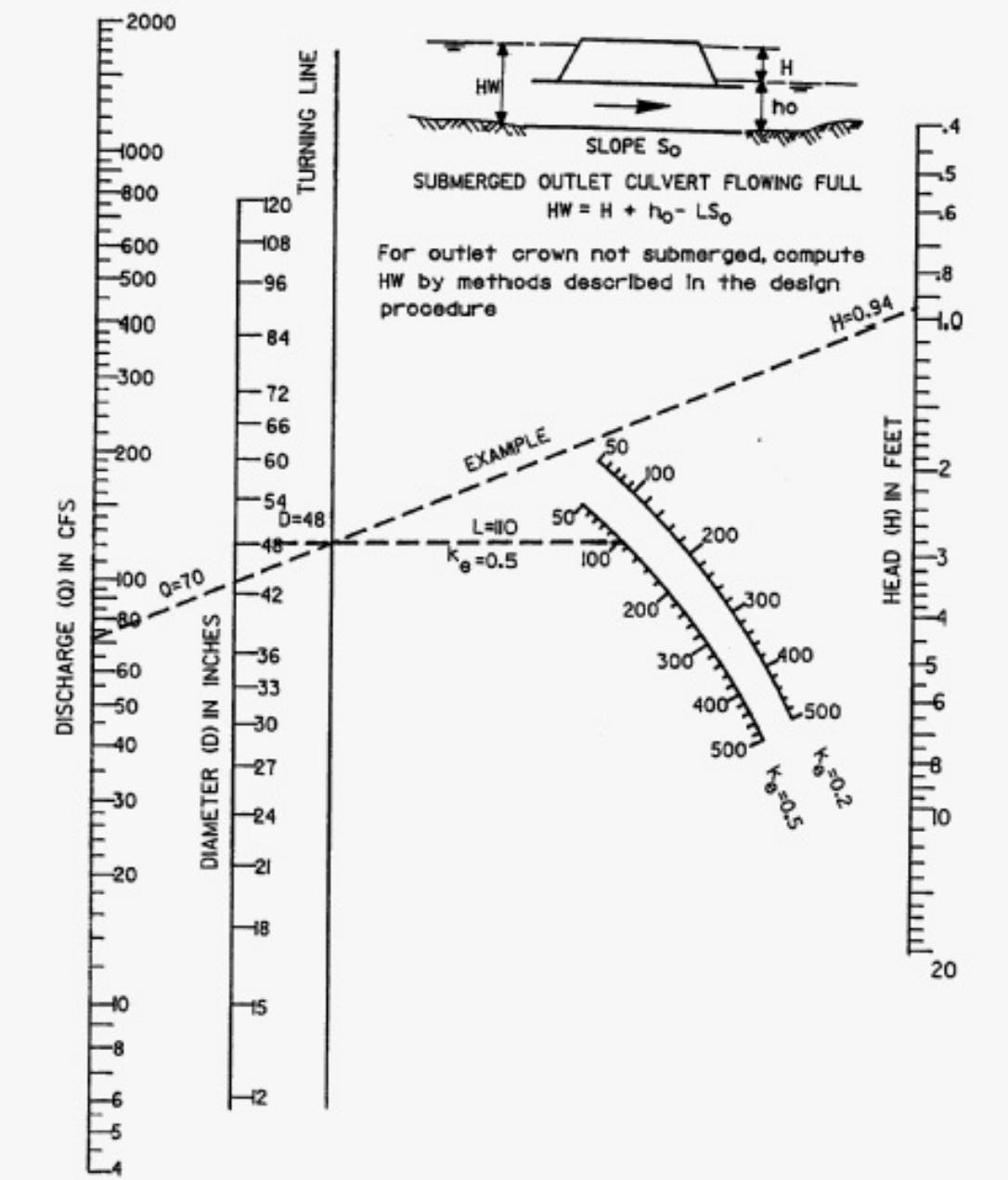


Source: "Handbook of Steel Drainage & Highway Construction Products", AISI 1971

Length Adjustment for Improved Hydraulics

Pipe Diam. in Feet	Roughness Factor: Curves Based on n=	Roughness Factor: Actual n'= •	Length Adjustment Factor $\left(\frac{n'}{n}\right)^2$
5'	.0328	.033	1.0
7'	.0320	.032	1.0
10'	.0311	.030	0.93
15'	.0302	.028	0.86

Figure 7-12 Outlet Control Nomograph, Circular RCP



Source: "Hydraulic Charts for the Selection of Highway Culverts", HEC-5, USDOT, FHA, Dec. 1965

Figure 7-13 Outlet Control Nomograph, Box Culverts

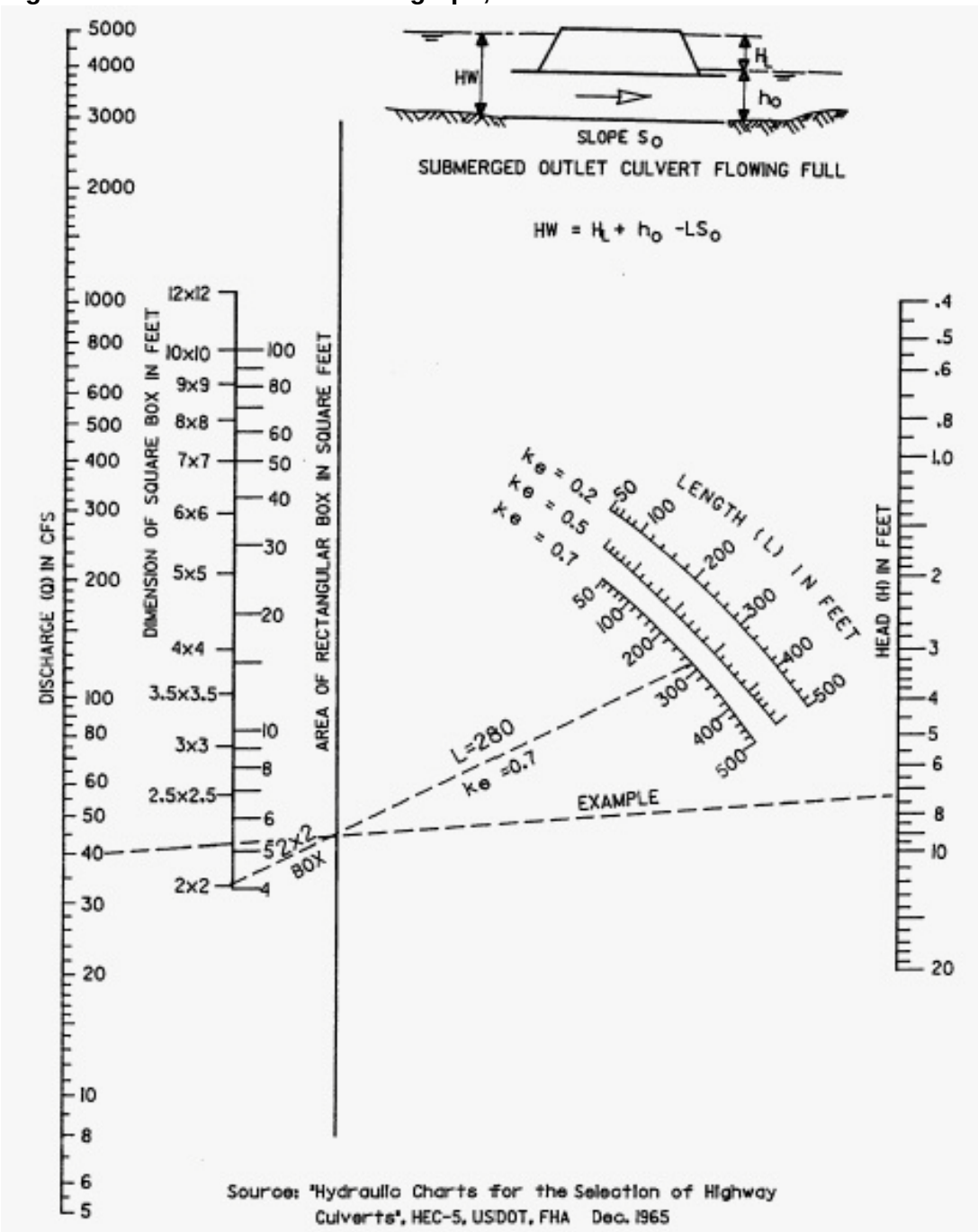
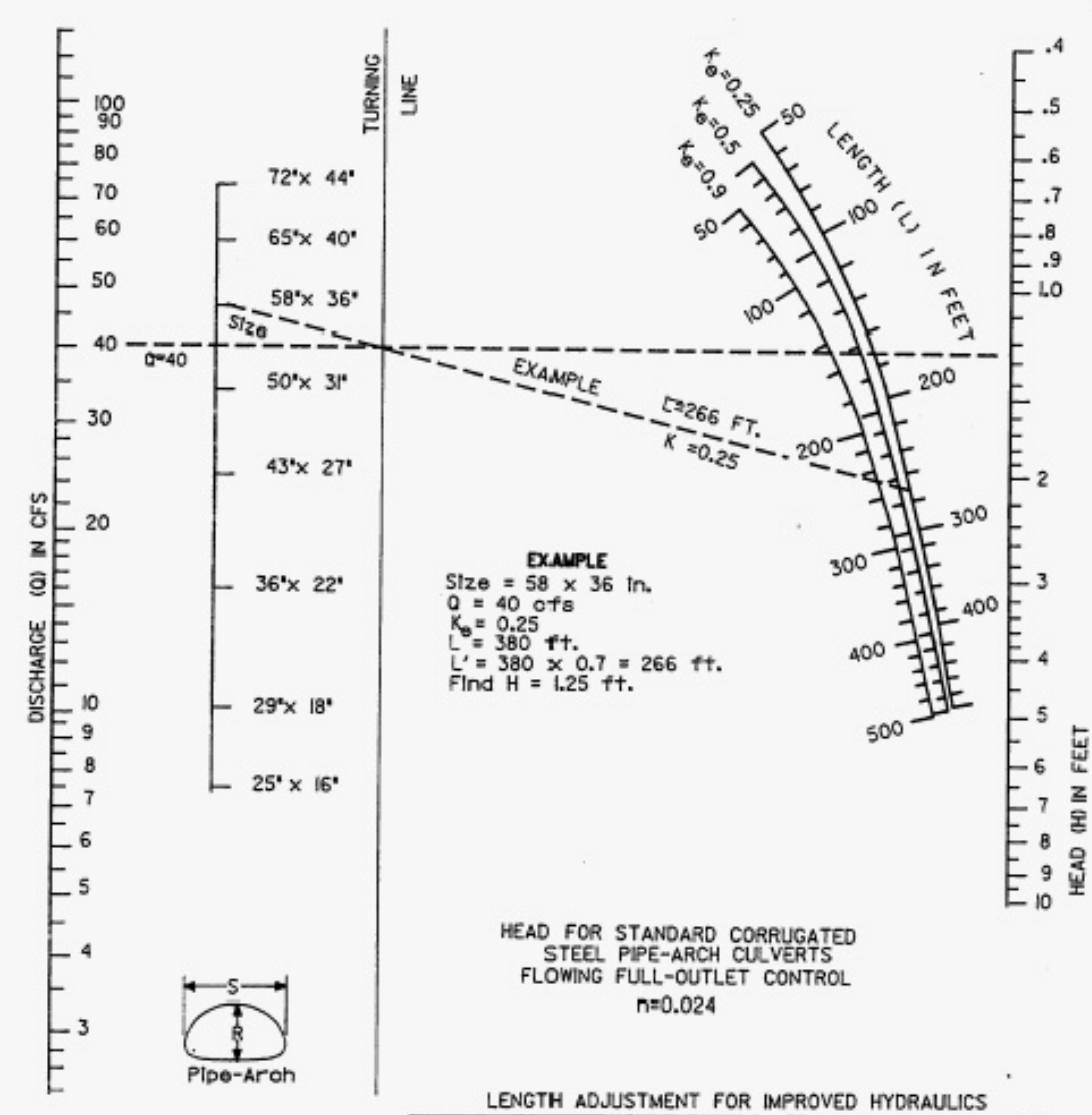


Figure 7-14 Outlet Control Nomograph, CSP Arch

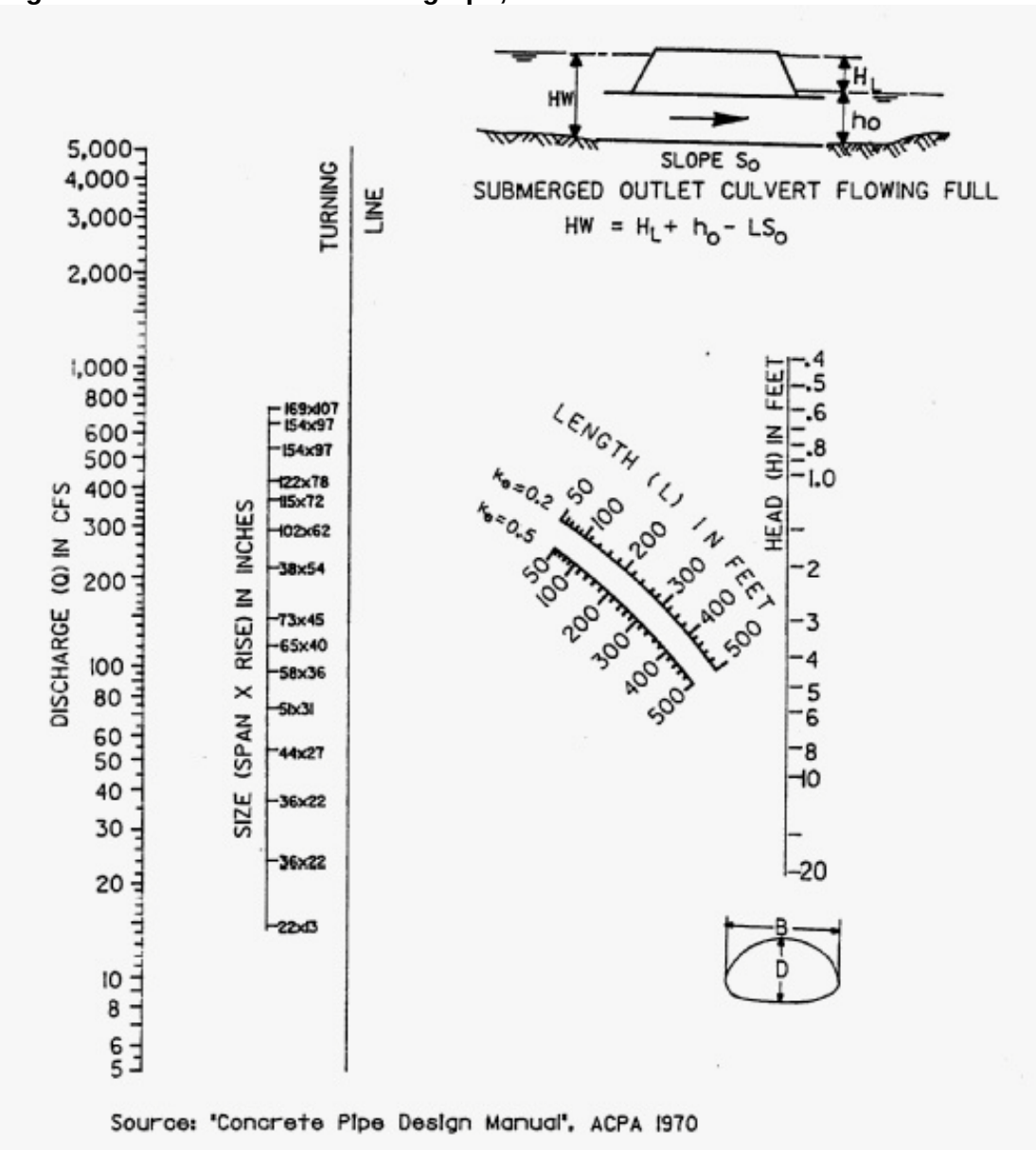


LENGTH ADJUSTMENT FOR IMPROVED HYDRAULICS

PIPE DIAMETER IN INCHES	ROUGHNESS FACTOR n' FOR HELICAL CORR.	LENGTH ADJUSTMENT FACTOR $\left(\frac{n'}{n}\right)^2$
12	.011	.21
24	.016	.44
36	.019	.61
48	.020	.70

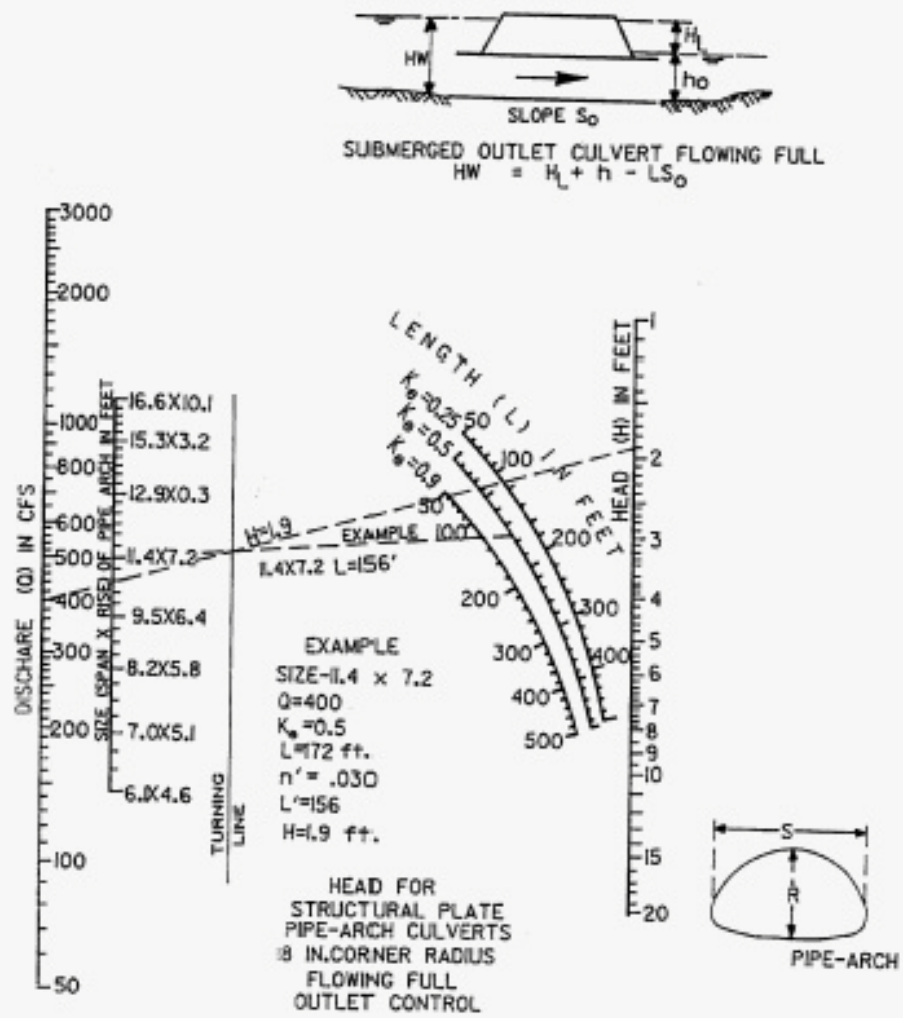
Source: "Handbook of Steel Drainage & Highway Construction Products", AISI 1971

Figure7-15 Outlet Control Nomograph, RCP Arch



Source: 'Concrete Pipe Design Manual', ACPA 1970

Figure 7-16 Outlet Control Nomograph, SPP Arch



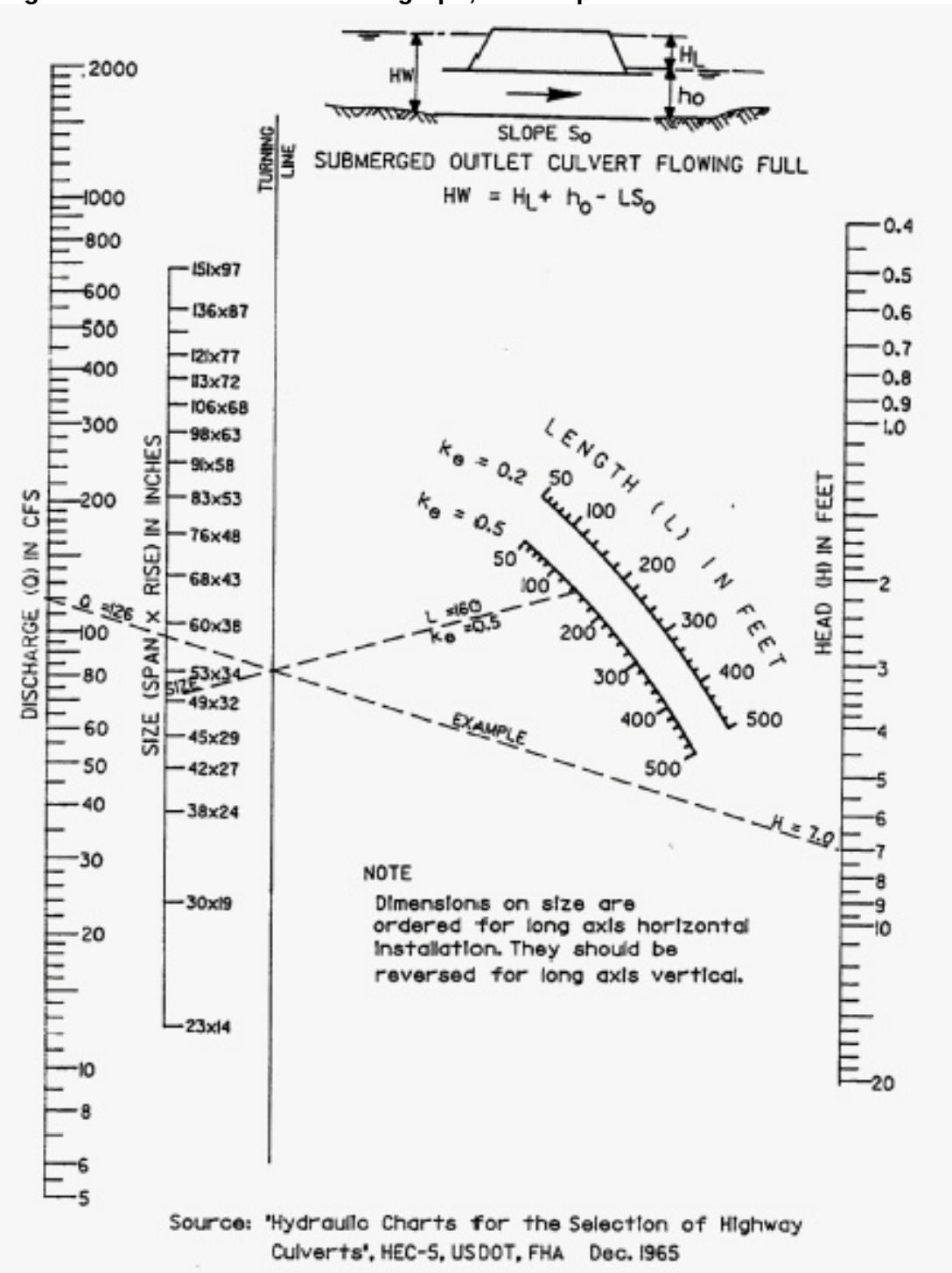
OUTLET CONTROL. Head for structural plate pipe-arch culvert with 18 in corner radius with submerged outlet and flowing full. For 31 in. corner radius, use structure sizes with equivalent areas on the 18-in. corner radius scale.

Length Adjustment for Improved Hydraulics

Pipe-Arch Size in Feet	Roughness Factor		Length Adjustment Factor $\left(\frac{n'}{n}\right)^2$
	Curves based on n	Actual n'	
6.1 x 4.6	.0327	.0327	1.0
8.1 x 5.8	.0321	.032	1.0
11.4 x 7.2	.0315	.030	0.907
16.6 x 10.1	.0306	.028	0.837

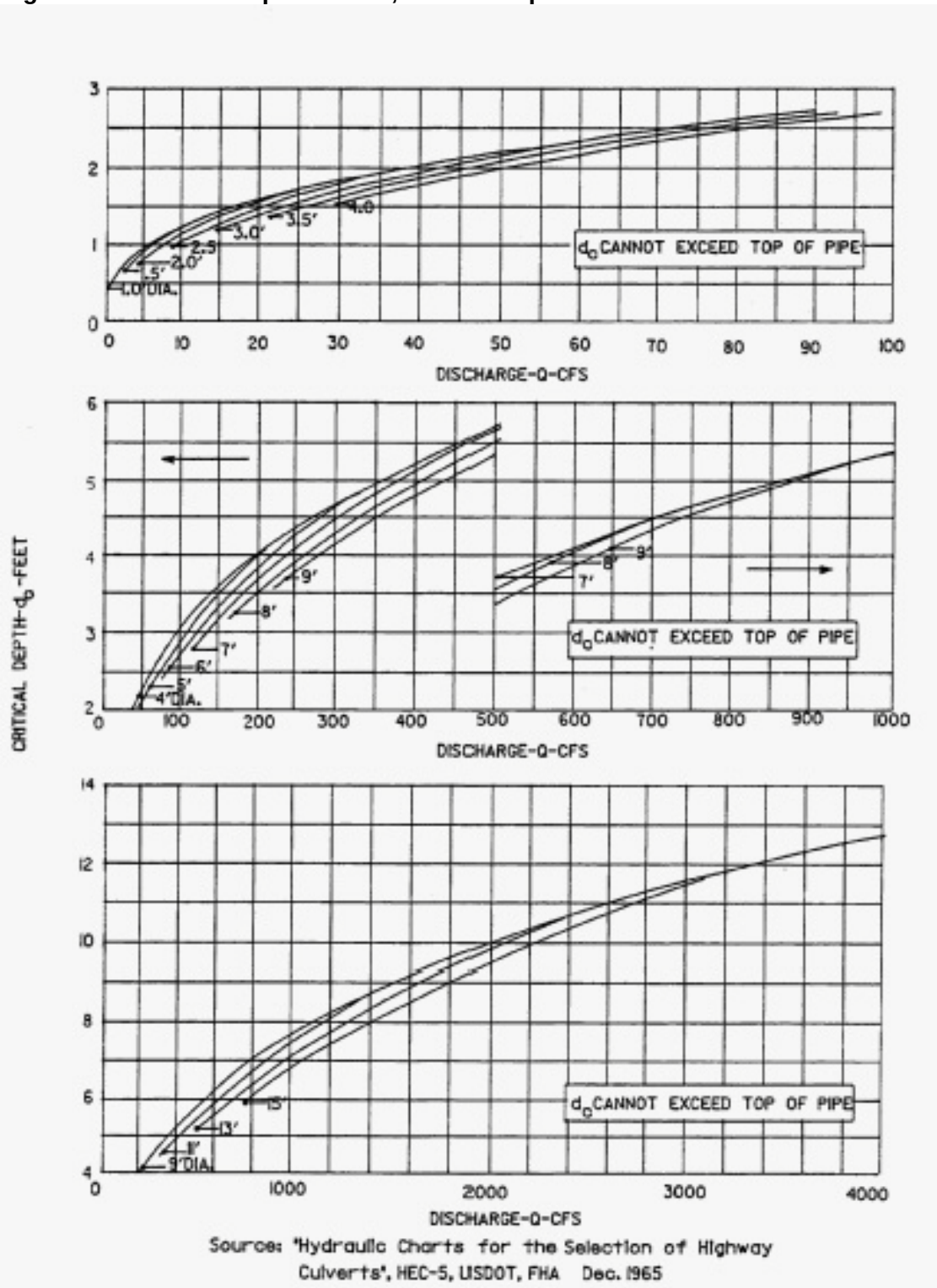
Source: 'Handbook of Steel Drainage & Highway Construction Products', AISI 1971

Figure 7-17 Outlet Control Nomograph, RCP Elipse



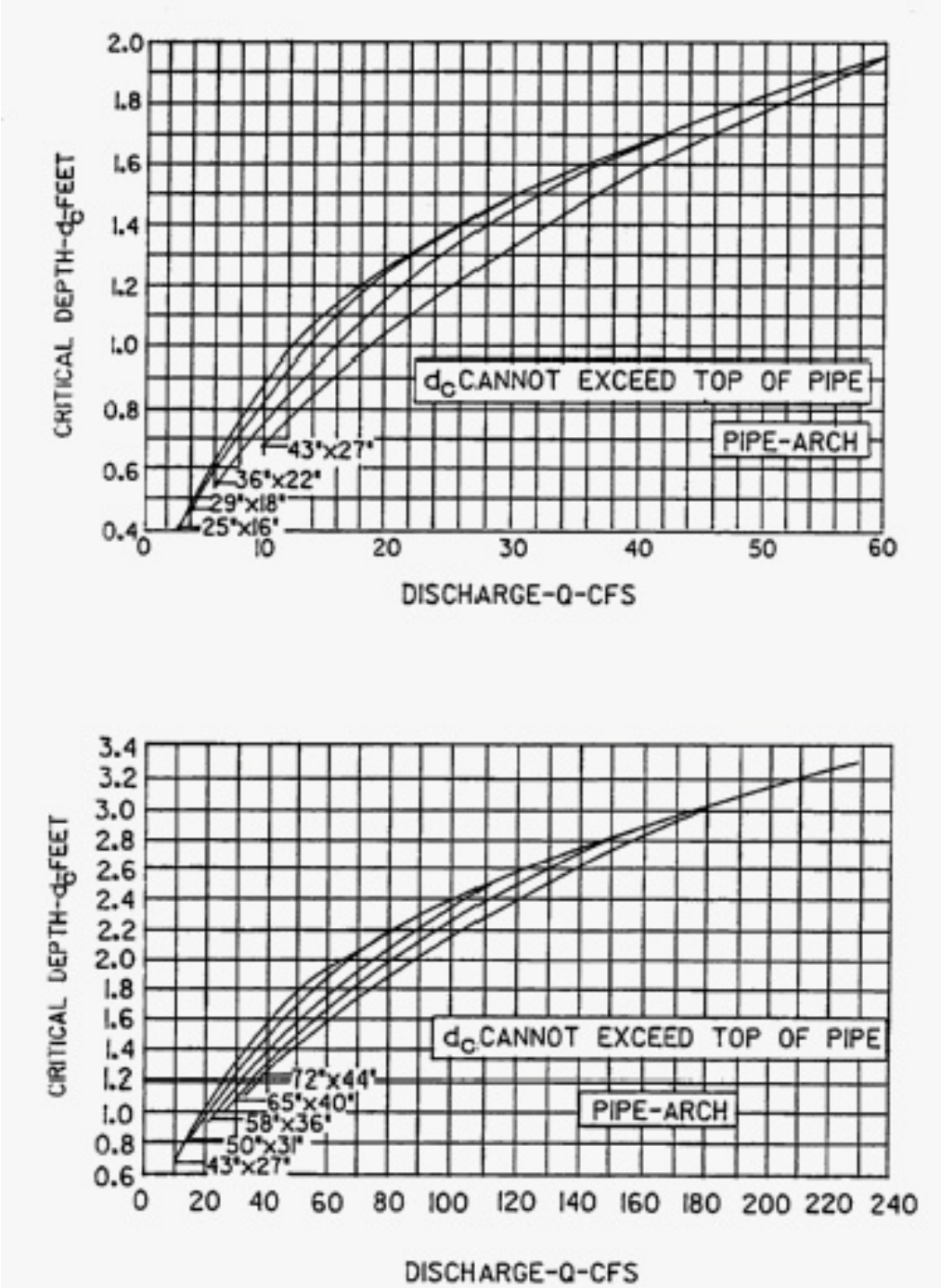
Source: 'Hydraulic Charts for the Selection of Highway Culverts', HEC-5, USDOT, FHA Dec. 1965

Figure 7-18 Critical Depth Curves, Circular Pipe



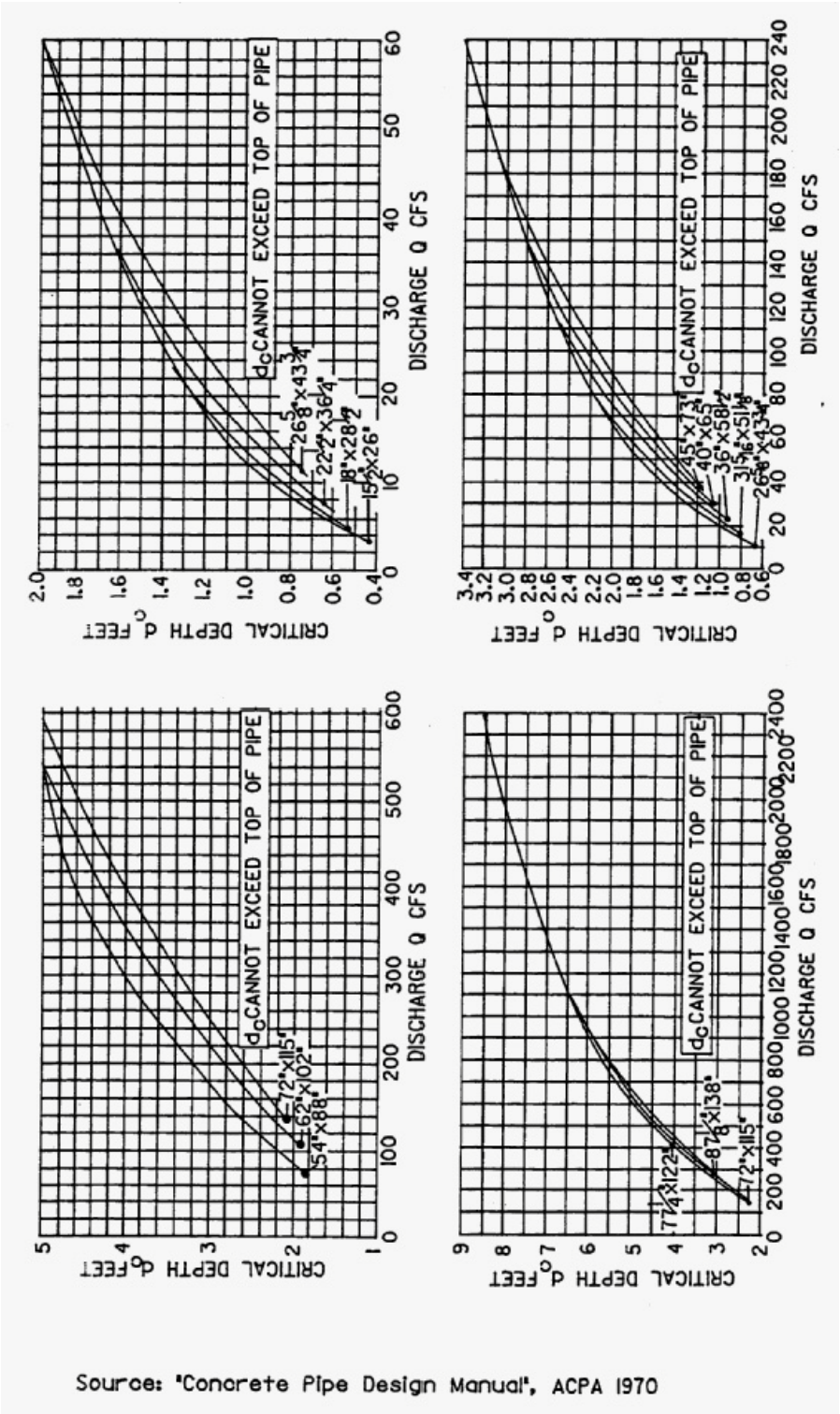
Source: "Hydraulic Charts for the Selection of Highway Culverts", HEC-5, USDOT, FHA Dec. 1965

Figure 7-19 Critical Depth Curves, CSP Arch



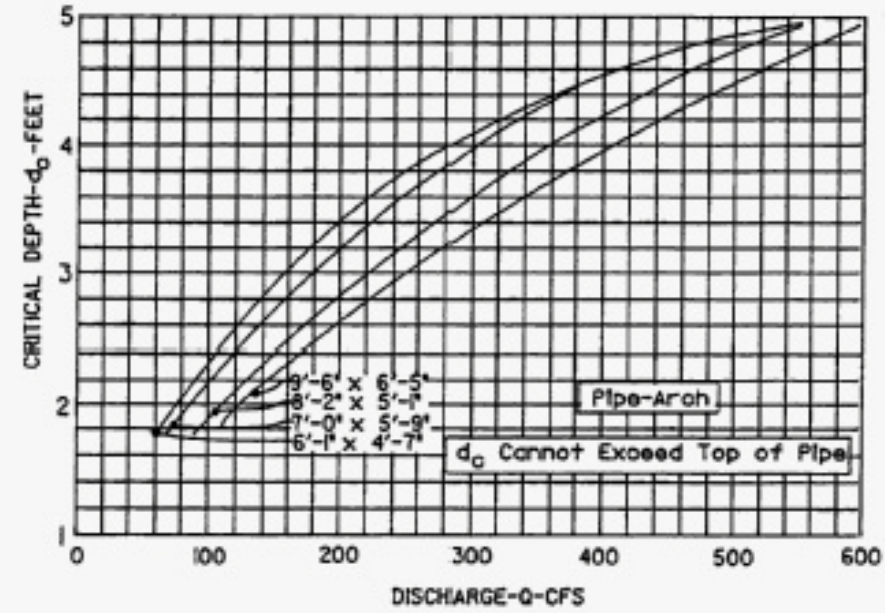
Source: "Handbook of Steel Drainage & Highway Construction Products", AISI 1971

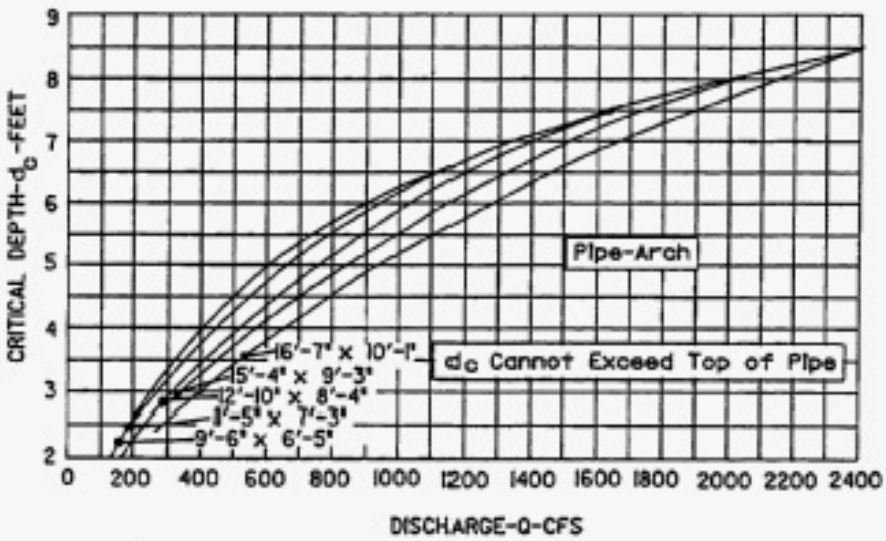
Figure 7-20 Critical Depth Curves, RCP Arch



Source: "Concrete Pipe Design Manual", ACPA 1970

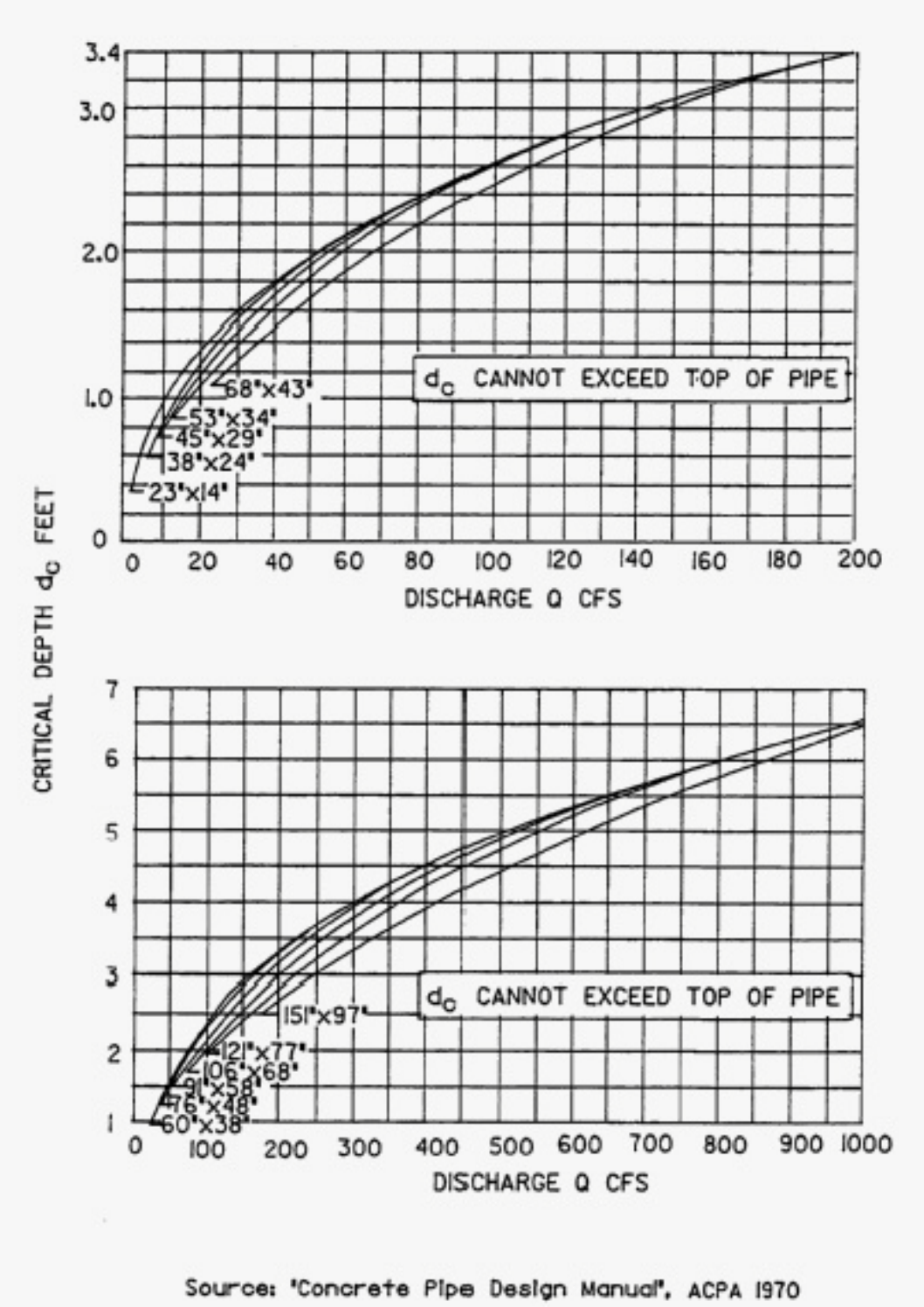
Figure 7-21 Critical Depth Curves, SSP Arch





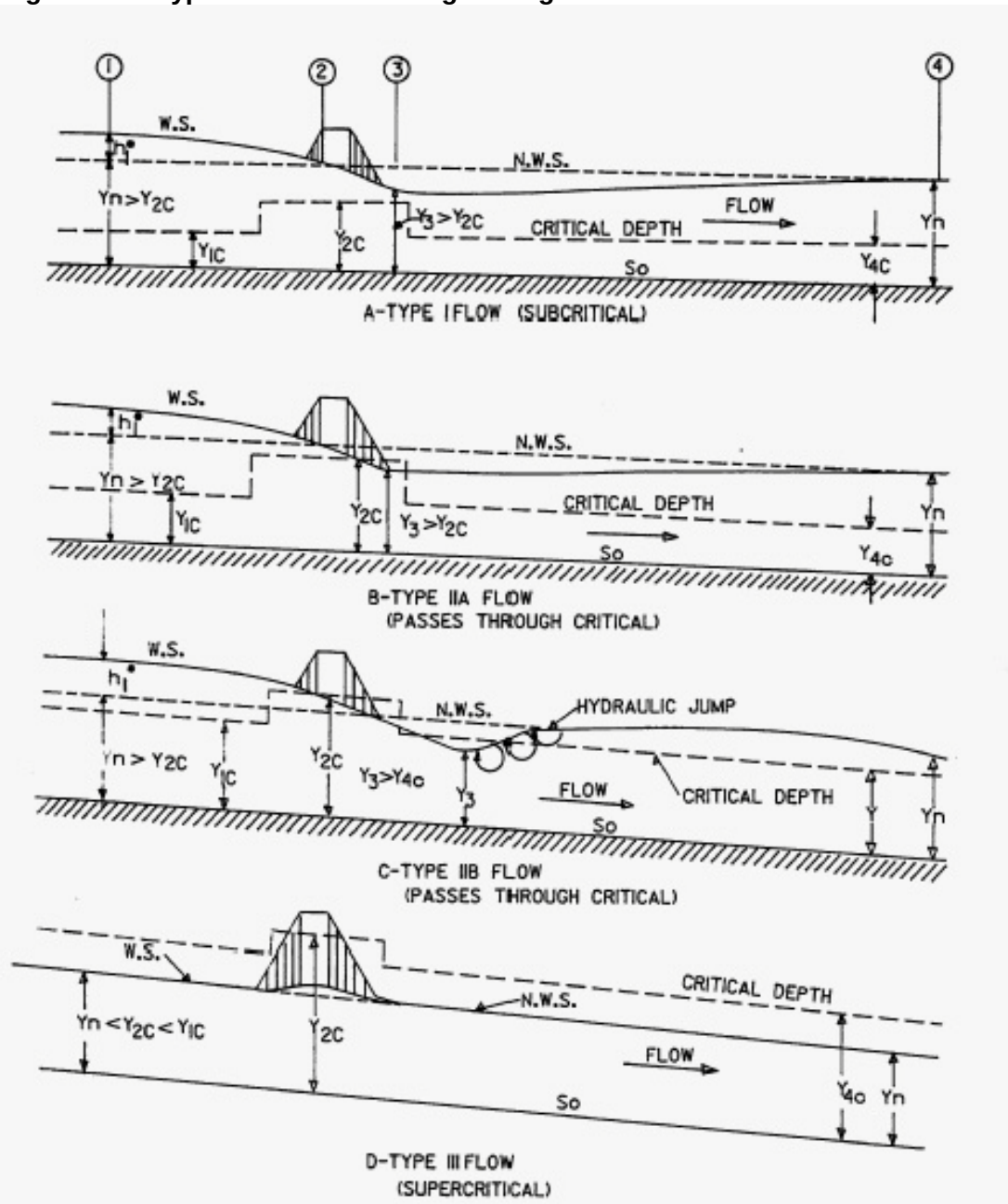
Source: "Handbook of Steel Drainage & Highway Construction Products", AISI 1971

Figure 7-22 Critical Depth Curves, RCP Elipse



Source: 'Concrete Pipe Design Manual', ACPA 1970

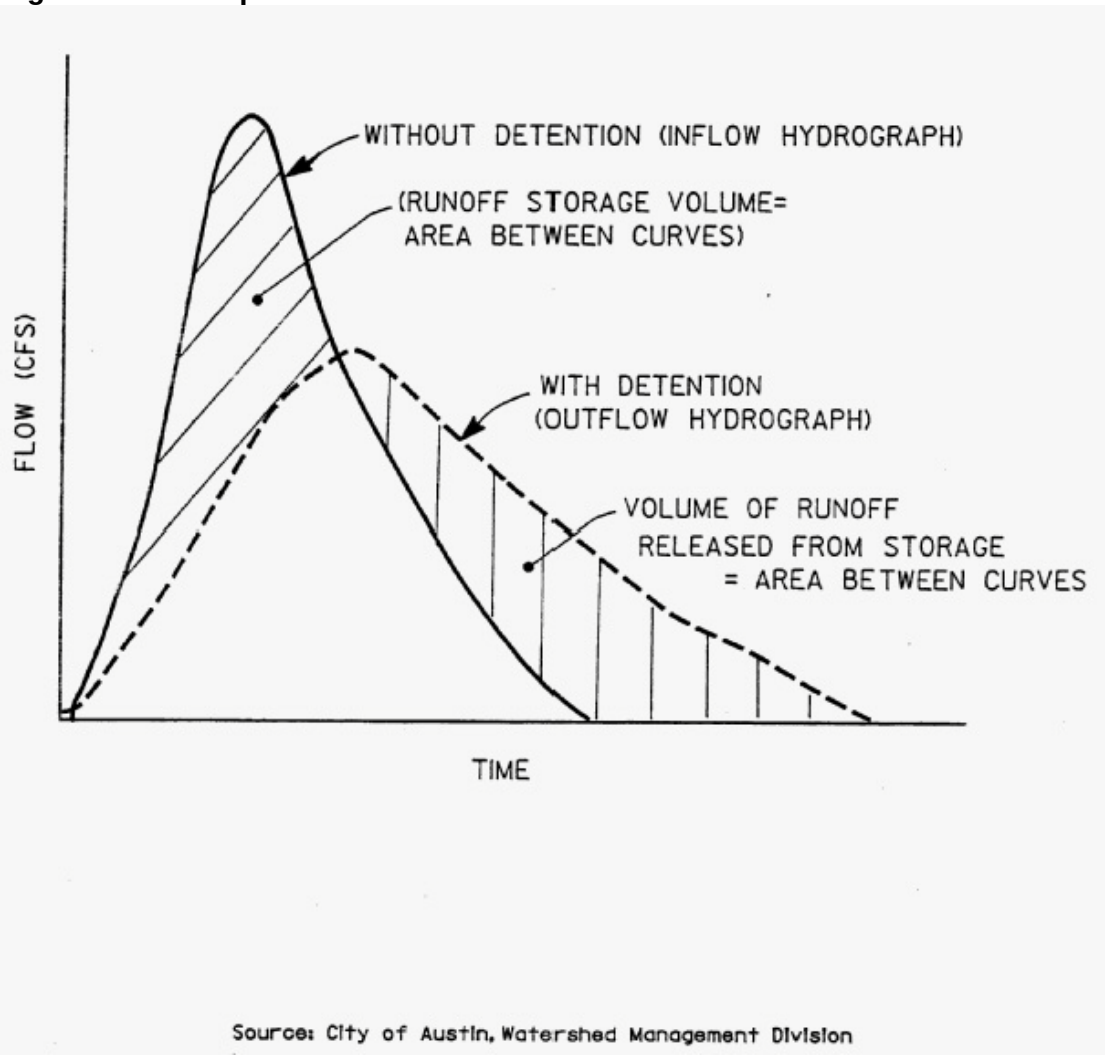
Figure 7-23 Types of Flow for Bridge Design



Source: Federal Highway Administration, 'Hydraulics of Bridge Waterways,' Hydraulic Design Series No. 1, Second Edition, September, 1973.

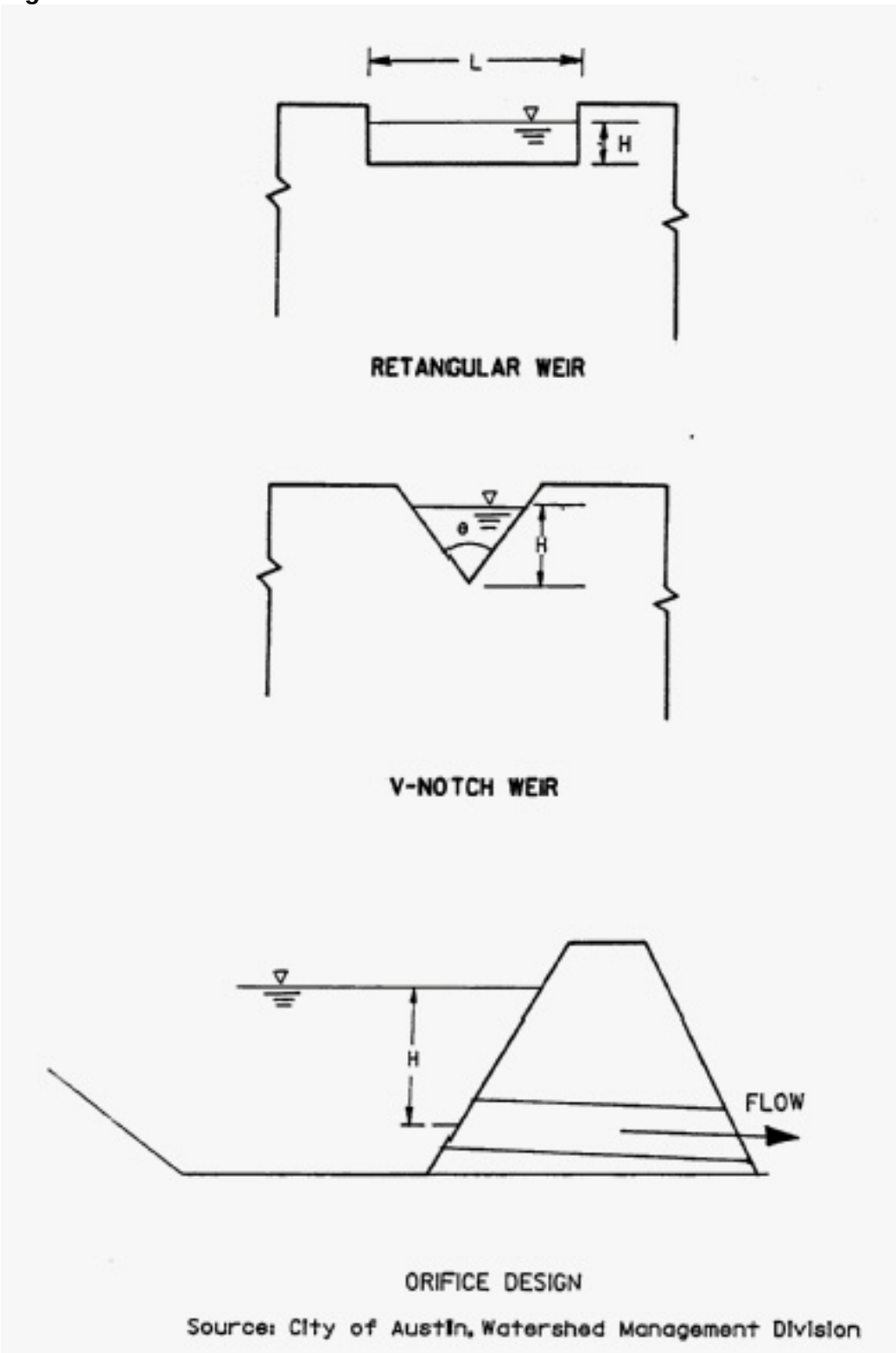
FIGURES FROM SECTION 8

Figure 8-1 Concept of Detention Pond



Source: City of Austin, Watershed Management Division

Figure 8-2 Weir and Orifice Flows



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GLOSSARY

Abutment - A wall supporting the end of a bridge or span, and sustaining the pressure of the abutting earth.

Apron - A floor or lining of concrete, timber, or other suitable material located at the inlet or discharge side of hydraulic structures (box culverts, spillways, etc.) designed to protect the waterway from erosion from falling water or turbulent flow.

Backwater - The rise of the water level upstream due to an obstruction or constriction in the channel.

Backwater Curve - The term applied to the longitudinal profile of the water surface in an open channel when flow is steady but non-uniform.

Baffle Chute - A drop structure in a channel or outlet of a pond with baffles for energy dissipation to permit the lowering of the hydraulic energy gradient in a short distance to accommodate topography.

Baffles - Deflector vanes, guides, grids, gratings, or similar devices constructed or placed in flowing water to: (1) cause a more uniform distribution of velocities; (2) dissipate energy; (3) divert, guide, or agitate the flow; and (4) mitigate eddy currents.

Calibration - Process of checking, adjusting, or standardizing operating characteristics of instruments and model appurtenances on a physical model or coefficients in a mathematical model. The process of evaluating the scale readings of an instrument in terms of the physical quantity to be measured.

Channel Roughness - The estimated measure of texture at the perimeters of channels and conduits. Usually represented by the Manning coefficient "n" used in the Manning Equation.

Chute - An inclined conduit or structure used for conveying water to a lower level.

Concentrated Flow - Stormwater runoff that moves through an open waterway or channel that is bounded by banks or walls, such as a swale, ditch, creek, river, or open pipe or culvert.

Conduit - Any open or closed device for conveying flowing water. Criteria

- A standard or rule on which a judgment or decision is based.

Critical Flow - The state of flow for a given discharge at which the specific energy is a minimum with respect to the bottom of the conduit.

Critical Slope - The minimum slope of a conduit which will produce critical flow

Crown - (1) The highest point on a transverse section of a conduit. -
(2) The highest point of a roadway cross section.

Culvert - Pipe or other conduit through which flow passes under a road or street.

Curb - A vertical or sloping structure located along the edge of a roadway, normally constructed integrally with the gutter, which strengthens and protects the pavement edge and clearly defines the pavement edge to vehicle operators.

Dam - A barrier constructed across a watercourse for the purpose of either temporarily or permanently impounding water.

Design Storm or Flood - The storm or flood which is used as the basis for design, i.e., against which the structure is designed to provide a stated degree of protection or other specified result.

Detention - The storage of storm runoff for a controlled release during or immediately following the design storm.

1. Off-site detention - A detention pond located outside the boundary of the area it serves.
2. On-site detention - A detention pond which is located within the specific site or subdivision it serves.
3. On-stream detention - The temporary storage of storm runoff behind embankments or dams located in a channel.
4. Regional detention - Detention facilities provided to control excess runoff based on a watershed-wide hydrologic analysis.

Drainage Area - The area contributing storm runoff to a stream or drainage system at a particular point.

Drop Structures - The function of a drop structure is to reduce channel velocities by allowing for flatter upstream and downstream channel slopes

Engineer - Shall mean a person who is duly licensed and registered to engage in the practice of professional engineering in the State of Texas.

Energy Grade Line - A line representing the energy in flowing water. The elevation of the energy line is equal to the summation of elevation of the flow line plus the depth, velocity head, and the pressure head.

Entrance Head - The head required to force flow into a conduit or other structure; it includes both entrance loss and velocity head.

Entrance Loss - Head lost in eddies or friction at the inlet to a conduit, headwall or structure.

Flood Control - The elimination or reduction of flood losses by the construction of flood storage reservoirs, channel improvements, dikes and levees, by-pass channels, or other engineering works.

Floodplain - Geographically the entire area subject to flooding.

Freeboard - The distance between the calculated water surface elevation and the

maximum physical elevation of the channel or pond, which is provided as an additional factor of safety.

Frequency (of storms, floods) - Average recurrence interval of events, over long periods of time. Mathematically, frequency is the reciprocal of the exceedance probability.

Friction Slope - The friction head or loss per unit length of channel or conduit. For uniform flow the friction slope coincides with the energy gradient, but where a distinction is made between energy losses due to bends, expansions, impacts, etc., a distinction must also be made between the friction slope and the energy gradient. The friction slope is equal to the bed or surface slope only for uniform flow in uniform open channels.

Froude Number - A flow parameter, which is a measure of the extent to which gravitational action affects the flow. A Froude number greater than 1 indicates supercritical flow and a value less than 1 subcritical flow.

Gabion - A wire basket containing rocks which is placed uniformly with others to provide protection against erosion.

Grade - The inclination or slope of a channel, conduit, or natural ground surface, usually expressed in terms of the ratio of vertical rise to horizontal distance.

Gutter - A shallow concrete waterway adjacent to a curb for conveying street flow.

Headwall - The normal functions of properly designed headwalls and endwalls are to anchor the culvert in order to prevent movement due to hydraulic and soil pressures, to control erosion and scour resulting from excessive velocities and turbulence and to prevent adjacent soil from sloughing into the waterway opening.

Headwater - (1) The upper reaches of a stream near its sources; (2) the region where ground waters emerge to form a surface stream; and (3) the headwater depth on the upstream side of a structure. (See Entrance Head)

Hydraulic Gradient - A hydraulic profile of the piezometric level of the water, representing the sum of the depth of flow and the pressure head. In open channel flow, it is the water surface.

Hydraulic Jump - The hydraulic jump is an abrupt rise in the water surface which occurs in an open channel when water flowing at supercritical velocity transitions to subcritical velocity. The transition through the jump results in a marked loss of energy, evidenced by turbulence of the flow within the area of the jump. The hydraulic jump is sometimes used as a means of energy dissipation.

Hydraulics - A branch of science that deals with practical applications of the mechanics of water movement.

Hydrograph - A graph or table showing discharge versus time at a given point on a stream or conduit.

1. Synthetic Hydrograph - Runoff or unit hydrographs which are devised by empirical means (as opposed to derivation based upon natural, measured data).

2. Unit Hydrograph - The direct runoff hydrograph resulting from one inch of precipitation excess distributed uniformly over a watershed for a specified duration.

Hydrology - The science that deals with the processes governing the depletion and replenishment of the water resources of the earth.

Hyetograph - A histogram or graph of rainfall intensity versus time for a storm.

Impervious - A term applied to a material through which water cannot pass, or through which water passes with great difficulty.

Infiltration - The absorption of water by the soil, either as it falls as precipitation, or from a stream flowing over the surface.

Inlet - The inflow point for a storm sewer system which is usually associated with streets (e.g., curb opening inlets, grate inlets, etc.).

Intensity - See Rainfall Intensity.

Invert - The floor, bottom, or lowest portion of the internal cross section of a conduit. Used particularly with reference to sewers, tunnels, and drains.

Lag Time - In hydrograph analysis lag time is the time from the centroid of the mass of excess rainfall to the peak of the runoff hydrograph.

Manning Coefficient - The coefficient of roughness used in the Manning Equation.

Manning Equation - A uniform flow equation used to relate velocity, hydraulic radius and the energy gradient slope.

May - A permissive condition. No requirement for design or application is intended.

Must - This is a mandatory condition. Where certain requirements in the design or application of the guidelines are described with the "must" stipulation, it is mandatory that the requirements be met.

One Hundred (100) Year Storm - Size of storm equaled or exceeded on the average once in one hundred (100) years (with given duration), or that storm having a one (1) percent chance of occurring in any given year.

One Hundred (100) Year Flood - Size of flood which might be expected to be equaled or exceeded once in one hundred (100) years on the average, or has a one (1) percent chance of occurring in any given year. Usually associated with the one hundred (100) year storm.

Orifice - An opening with closed perimeter, and of regular form in a plate, wall, or partition, through which water may flow.

Overland Flow - Runoff which is not considered concentrated. Other term is sheet flow.

Peak Flow (Peak Rate of Runoff) - the maximum rate of flow past a particular point for a given storm.

Policy - A definite course or method of action selected to guide and determine present and future decisions.

Precipitation - Any moisture that falls from the atmosphere, including snow, sleet, rain and hail.

Prismatic Channel - A channel built with unvarying cross section and constant bottom slope.

Probable Maximum Flood (PMF) - The flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region.

Probable Maximum Precipitation - The critical depth-duration-area rainfall relationship which would result from a storm containing the most critical meteorological conditions considered probable of occurring.

Rainfall Duration - The length of time over which a discrete rainfall event lasts.

Rainfall Frequency - The average recurrence interval of rainfall events, averaged over long periods of time.

Rainfall Intensity - The rate of accumulation of rainfall, usually in inches per hour.

Rational Formula - A traditional means of relating runoff from an area and the intensity of the storm rainfall ($Q = CiA$).

Reach - Any length of river or channel. Usually used to refer to sections which are uniform with respect to discharge, depth, area or slope, or sections between gaging stations.

Recommended - A condition which should be met if it is physically and economically reasonable to do so.

Required - This is a mandatory condition. Where certain requirements in the design or application of the guidelines are described with the "required" stipulation, it is mandatory that they be met.

Recurrence Interval - The average interval of time within which a given event will be equaled or exceeded once. For an annual series (as opposed to a partial duration series) the probability of occurrence in any one (1) year is the inverse of the recurrence interval. Thus a flood having a recurrence interval of one hundred (100) years has a one (1) percent probability of being equaled or exceeded in any one year.

Return Period - See Recurrence Interval.

Right-of-way - Land dedicated by a plat or separate instrument to and for use as a public roadway.

Riprap (Revetment) - Forms of bank protection, usually using rock. Riprap is a term applied to stone which is dumped rather than placed more carefully. In Austin concrete is often called riprap.

Routing - Routing is a technique used to predict the temporal and spatial variations of a flood wave as it traverses a river reach or reservoir. Generally, routing techniques may be classified into two categories - hydrologic routing and hydraulic routing.

Runoff - That part of the precipitation which reaches a stream, drain or sewer.

Runoff Coefficient (C) - A decimal number used in the Rational Formula which defines the runoff characteristics of the drainage area under consideration. It may be applied to an entire drainage basin as a composite representation or it may be applied to a small individual area such as one residential lot.

Sediment - Material of soil and rock origin transported, carried, or deposited by water.

Shall - This is a mandatory condition. Where certain requirements in the design or application of the guidelines are described with the "shall" stipulation, it is mandatory that the requirements be met.

Sheet Flow - Stormwater runoff that flows downslope over relatively smooth surfaces in the form of a thin, continuous iayer that does not vary in depth in a direction perpendicular to the direction of flow.

Should - An advisory condition. Where the word "should" is used, it is considered to be advisable usage, recommended but not mandatory.

Soffit - The bottom of the top of a pipe. In a sewer pipe, the uppermost point on the inside of the structure. In contrast, the crown is the uppermost point on the outside of the pipe wall.

Soil Conservation Service (SCS) Runoff Curve Number (CN) - Index number used by the SCS as a measure of the tendency of rainfall to run off into streams rather than evaporate or infiltrate.

Steady Flow - Open channel flow is said to be steady if the depth of flow does not change or if it can be assumed to be constant during the time interval of consideration.

Stilling Basin - Pool of water conventionally used, as part of a drop structure or other structure, to dissipate energy.

Tailwater - The depth of flow in the stream immediately downstream of a hydraulic structure.

Time of Concentration - The time associated with the travel of runoff from an outer point which best represents the shape of the contributing area.

Total Head - In the flow process, the total energy for a given point is represented by the summation of $V^2/2g$, p/ and z. The units for these three (3) items are foot-pounds force per pound force. It is common practice to lump all these three (3) items together as total head in feet. The item of \/2/2g is called velocity head (in feet) and p/ is the pressure head (in feet).

Trunk Line - The primary collector line of a storm sewer system

Uniform Channel - A channel with a constant cross section and roughness.

Uniform Flow - Open channel flow is said to be uniform if the depth of flow is the same at every section of the channel, for a constant flow.

Unit Hydrograph - See Hydrograph.

Watershed - The total area contributing storm runoff to a stream or creek.

Weir - A weir is a notch of regular form through which water flows.

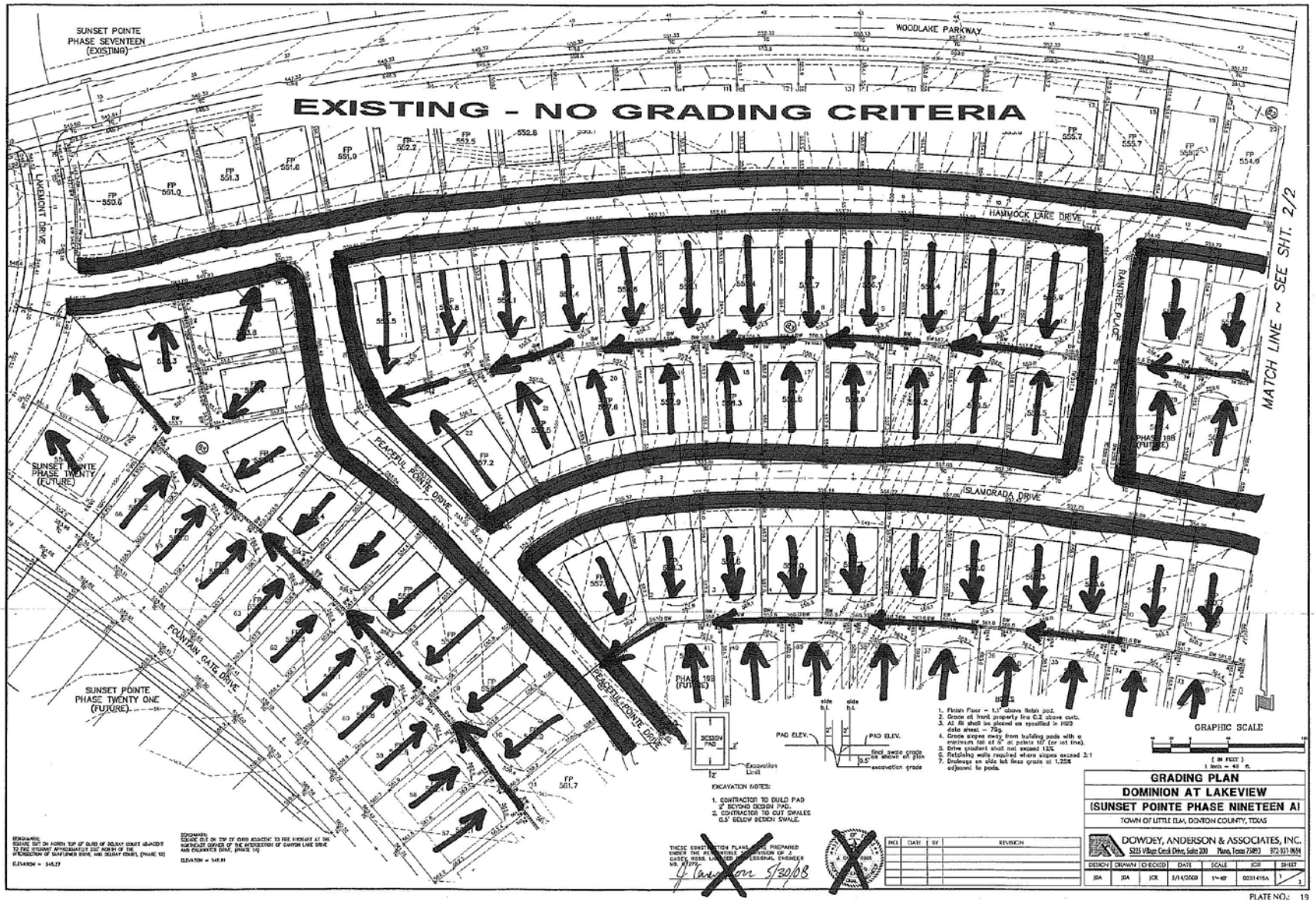

EXISTING - NO GRADING CRITERIA
SUNSET POINTE PHASE SEVENTEEN (EXISTING)
WOODLAKE PARKWAY
HAMMOCK LAKE DRIVE
LAKEMONT DRIVE
RAINTREE PLACE
MATCH LINE ~ SEE SHT. 2/2
PEACEFUL POINTE DRIVE
ISLAMORADA DRIVE
SUNSET POINTE PHASE TWENTY (FUTURE)
FOUNTAIN GATE DRIVE
SUNSET POINTE PHASE TWENTY ONE (FUTURE)
PHASE 19B (FUTURE)
DECISION PAD
Excavation Limit
PAD ELEV.
field swale grade as shown on plan
excavation grade
GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.
EXCAVATION NOTES:
1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.
NOTES
1. Finish Floor = 1.1' above finish pad.
2. Grade at front property line 0.2 above curb.
3. All fill shall be placed as specified in FBFD data sheet - 79g.
4. Grade slopes away from building pads with a minimum fall of 6" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.
THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF J. GARY ROSS, LICENSED PROFESSIONAL ENGINEER NO. 87073
5/20/08
NO. DATE BY REVISION
GRADING PLAN
DOMINION AT LAKEVIEW
(SUNSET POINTE PHASE NINETEEN A)
TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS
DOWDEY, ANDERSON & ASSOCIATES, INC.
5235 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-0654
DESIGN JDA DRAWN JDA CHECKED JCR DATE 5/14/2008 SCALE 1"=40' JOB 0201415A SHEET 1 2

PLATE NO.: 19

IDEAL - NO LOT TO LOT DRAINAGE

SUNSET POINTE PHASE SEVENTEEN (EXISTING)

WOODLAKE PARKWAY

LAKEMONT DRIVE

HAMMOCK LAKE DRIVE

RAINTREE PLACE

MATCH LINE ~ SEE SHT. 2/2

PEACEFUL POINTE DRIVE

ISLAMORADA DRIVE

FOUNTAIN GATE DRIVE

SUNSET POINTE PHASE TWENTY (FUTURE)

SUNSET POINTE PHASE TWENTY ONE (FUTURE)

PHASE 19B (FUTURE)

PHASE 19A (FUTURE)

DESIGN PAD

Excavation Limit

PAD ELEV.

PAD ELEV.

slab b.l.

slab b.l.

final swale grade 0.5' as shown on plan

excavation grade

EXCAVATION NOTES:

1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.

NOTES

1. Finish Floor = 1.5' above finish pad.
2. Grade at front property line 0.2 above curb.
3. All fill shall be placed as specified in HUD data sheet - 79g.
4. Grade slopes away from building pads with a minimum fall of 6" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%.
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

BENCHMARK:
SQUARE CUT ON NORTH SIDE OF CURB OF DELRAY COURT ADJACENT TO FIRE HYDRANT APPROXIMATELY 200' NORTH OF THE INTERSECTION OF SAWTOOTH DRIVE AND DELRAY COURT. (PHASE 12)

ELEVATION = 545.37

BENCHMARK:
SQUARE CUT ON TOP OF CURB ADJACENT TO FIRE HYDRANT AT THE NORTHEAST CORNER OF THE INTERSECTION OF CANYON LAKE DRIVE AND GALVANTER DRIVE. (PHASE 14)

ELEVATION = 545.97

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF J. CASEY ROSS, LICENSED PROFESSIONAL ENGINEER NO. 97272.

J. Casey Ross 5/20/08

STATE OF TEXAS
J. CASEY ROSS
97272
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	BY	REVISION

GRADING PLAN
DOMINION AT LAKEVIEW
(SUNSET POINTE PHASE NINETEEN A)

TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS

DOWDEY, ANDERSON & ASSOCIATES, INC.
5225 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-0674

DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB	SHEET
JBA	JBA	JCR	5/14/2008	1"=40'	6208145A	1 / 3

PLATE NO. 10

PROPOSED - SINGLE LOT TO LOT DRAINAGE

SUNSET POINTE PHASE SEVENTEEN (EXISTING)

WOODLAKE PARKWAY

LAKEMONT DRIVE

HAMMOCK LAKE DRIVE

RAINTREE PLACE

PEACEFUL POINTE DRIVE

ISLAMORADA DRIVE

FOUNTAIN GATE DRIVE

SUNSET POINTE PHASE TWENTY (FUTURE)

SUNSET POINTE PHASE TWENTY ONE (FUTURE)

PHASE 16B (FUTURE)

PHASE 16A (FUTURE)

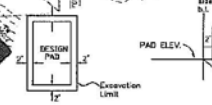
MATCH LINE ~ SEE SHT. 2/2

BENCHMARK:
SQUARE CUT ON NORTH TOP OF CURB OF DELRAY COURT ADJACENT TO FIRE HYDRANT APPROXIMATELY 3.0' NORTH OF THE INTERSECTION OF SUNFLOWER DRIVE AND DELRAY COURT. (PHASE 13)

ELEVATION = 548.37

BENCHMARK:
SQUARE CUT ON TOP OF CURB ADJACENT TO FIRE HYDRANT AT THE NORTHEAST CORNER OF THE INTERSECTION OF CANYON LAKE DRIVE AND CALIMATER DRIVE. (PHASE 14)

ELEVATION = 548.31



EXCAVATION NOTES:

1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.

NOTES

1. Finish Floor – 1.3' above finish pad.
2. Grade at front property line 0.2 above curb.
3. All fill shall be placed as specified in IBC date sheet – /fig.
4. Grade slopes away from building pads with a minimum fall of 6" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF J. CASEY ROSE, LICENSED PROFESSIONAL ENGINEER NO. 87272

5/30/08

NO.	DATE	BY	REVISION

GRADING PLAN

DOMINION AT LAKEVIEW

(SUNSET POINTE PHASE NINETEEN A)

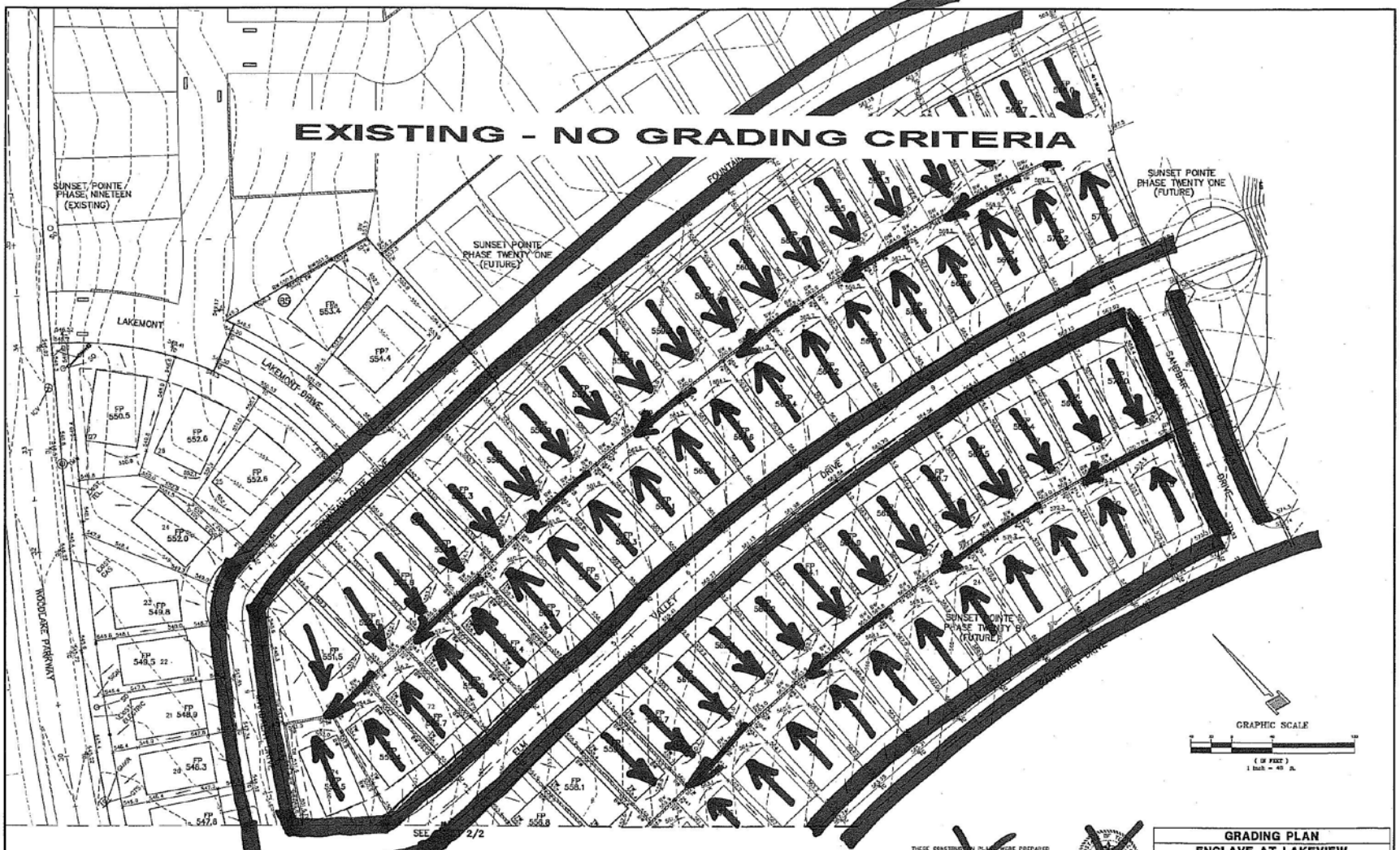
TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS

DOWDEY, ANDERSON & ASSOCIATES, INC.
5125 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-8684

DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB	SHEET
JBA	JBA	JCR	5/14/2008	1"=40'	0331419A	1 of 2

PLATE NO. 10

EXISTING - NO GRADING CRITERIA

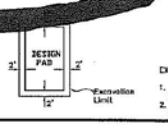


BENCHMARK:
SQUARE CUT ON NORTH TOP OF CURB OF DELRAY COURT ADJACENT TO FIRE HYDRANT APPROXIMATELY 20'NF NORTH OF THE INTERSECTION OF SUNFLOWER DRIVE AND DELRAY COURT. (PHASE 18)

ELEVATION = 546.27

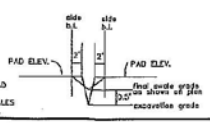
BENCHMARK:
SQUARE CUT ON TOP OF CURB ADJACENT TO FIRE HYDRANT AT THE NORTHEAST CORNER OF THE INTERSECTION OF CANYON LAKE DRIVE AND EAGLEWOOD DRIVE. (PHASE 14)

ELEVATION = 546.91



EXCAVATION NOTES:

1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.



NOTES

1. Finish Floor = 1.1' above finish pad.
2. Grade at front property line 0.2 above curb.
3. All fill shall be placed as specified in HUD data sheet - 79g.
4. Grade slopes away from building pads with a minimum fall of 6" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%.
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF J. CASEY ROSS, LICENSED PROFESSIONAL ENGINEER NO. 97261.

J Casey Ross 7/2/08

NO.	DATE	BY	REVISION

GRADING PLAN
ENCLAVE AT LAKEVIEW
ISUNSET POINTE PHASE TWENTY AI
TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS

DOWDEY, ANDERSON & ASSOCIATES, INC.
5225 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-0694

DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB	SHEET
JBA	JBA	JCR	5/14/2008	1"=40'	0201-120A	1 / 2

IDEAL - NO LOT TO LOT DRAINAGE

SUNSET POINTE PHASE NINETEEN (EXISTING)

SUNSET POINTE PHASE TWENTY ONE (FUTURE)

SUNSET POINTE PHASE TWENTY ONE (FUTURE)

SUNSET POINTE PHASE TWENTY ONE (FUTURE)

LAKEMONT

LAKEMONT DRIVE

FOUNTAIN GATE DRIVE

WOODLAKE PARKWAY

MANDALAY DRIVE

VALLEY DRIVE

ELM

RAINVIEW DRIVE

SANDCLIFF DRIVE

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

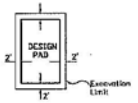
SEE SHEET 2/2

BENCHMARK:
SQUARE CUT ON NORTH TOP OF CURB OF DOGRAY COURT ADJACENT TO FIRE HYDRANT APPROXIMATELY 200' NORTH OF THE INTERSECTION OF SUNFLOWER DRIVE AND DOGRAY COURT. (PHASE 12)

ELEVATION = 246.37

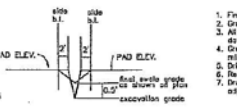
BENCHMARK:
SQUARE CUT ON TOP OF CURB ADJACENT TO FIRE HYDRANT AT S/C NORTHEAST CORNER OF THE INTERSECTION OF CANYON LAKE DRIVE AND CALLOWAY DRIVE. (PHASE 14)

ELEVATION = 246.53



EXCAVATION NOTES:

1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.



NOTES

1. Finish Floor = 1.1' above finish pad.
2. Grade at front property line 0.2 above curb.
3. All fill shall be placed as specified in IUD data sheet - 73p.
4. Grade slopes away from building pads with a minimum fall of 5" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%.
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF J. CASEY ROSS, LICENSED PROFESSIONAL ENGINEER NO. 97232

J. Casey Ross 7/2/08

STATE OF TEXAS
J. CASEY ROSS
97232
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	BY	REVISION

GRADING PLAN

ENCLAVE AT LAKEVIEW

(SUNSET POINTE PHASE TWENTY A)

TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS

DOWDEY, ANDERSON & ASSOCIATES, INC.
5225 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-0684

DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB	SHEET
JBA	JBA	JCK	5/14/2008	1"=40'	0201420A	1 / 2

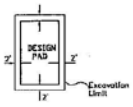
PROPOSED - SINGLE LOT TO LOT DRAINAGE

BENCHMARK:
SQUARE CUT ON NORTH TOP OF CURB OF DEGRAY COURT ADJACENT TO FIRE HYDRANT APPROXIMATELY 200' NORTH OF THE INTERSECTION OF SANDLINGER DRIVE AND DEGRAY COURT. (PHASE 12)

ELEVATION = 545.37

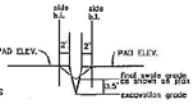
BENCHMARK:
SQUARE CUT ON TOP OF CURB ADJACENT TO FIRE HYDRANT AT THE NORTHEAST CORNER OF THE INTERSECTION OF CANYON LAKE DRIVE AND SUNNYSIDE DRIVE. (PHASE 11)

ELEVATION = 546.81



EXCAVATION NOTES:

1. CONTRACTOR TO BUILD PAD 2' BEYOND DESIGN PAD.
2. CONTRACTOR TO CUT SWALES 0.5' BELOW DESIGN SWALE.



NOTES

1. Finish Floor = 1.1' above finish pad.
2. Grade at front property line 0.2' above curb.
3. All fill shall be placed as specified in HUD data sheet - 79g.
4. Grade slopes away from building pads with a minimum fall of 6" at points 10' (or lot line).
5. Drive gradient shall not exceed 12%.
6. Retaining walls required where slopes exceed 3:1
7. Drainage on side lot lines grade at 1.25% adjacent to pads.

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE SUPERVISION OF J. CASEY PICKS, LICENSED PROFESSIONAL ENGINEER NO. 97216

J. Casey Picks 7/2/05

NO	DATE	BY	REVISION

GRADING PLAN

ENCLAVE AT LAKEVIEW

(SUNSET POINTE PHASE TWENTY A)

TOWN OF LITTLE ELM, DENTON COUNTY, TEXAS

DOWDEY, ANDERSON & ASSOCIATES, INC.
5225 Village Creek Drive, Suite 200 Plano, Texas 75093 972-931-0654

DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB	SHEET
JBA	JBA	JCR	5/14/2002	1"=40'	0308.420A	1 / 3

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. H-4
Contact – J. Mike Baker, Fire Chief/EMC, 547-2514
mbaker@ci.copperas-cove.tx.us

SUBJECT: **Public hearing on the annexation of 6.8 acres owned by the City of Copperas Cove to the City.**

---

1. BACKGROUND/HISTORY

On January 26, 2010, the City of Copperas Cove purchased 4.6 acres of land and received an in kind donation of 2.2 acres of land immediately adjacent to the property that was purchased. Both properties are situated at the intersection of Farm to Market Road 1113 and Grimes Crossing Road. Both properties are located within the City's Extra Territorial Jurisdiction (ETJ). A new fire station is proposed to be constructed on the property at a future date.

After consultation with the City Attorney to ensure proper procedures are followed, City staff selected dates and times for two public hearings to be conducted as required by Local Government Code §43.063(a).

As required by Local Government Code §43.063(c), a public notice of the date and time set for the first public hearing was published in the local newspaper on July 20, 2010 and published on the City's website on July 21, 2010. On August 3, 2010, the first public hearing was held as required by Local Government Code §43.063(a).

Reading of the Annexation Ordinance is scheduled for September 7, 2010.

2. FINDINGS/CURRENT ACTIVITY

As required by Local Government Code §43.063(c), a public notice of the date and time set for the second public hearing was published in the local newspaper on August 3, 2010. Also required by the code is the posting of a public notice on the City's website. The requirement was satisfied on July 21, 2010 and will remain on the website as required until the completion of the public hearing process.

3. FINANCIAL IMPACT

Sufficient funds exist in the General Fund Planning Department operating budget to cover the required advertisement expenditures.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends the City Council hold the second of two required public hearings.

DESCRIPTION OF A 4.60 ACRE TRACT OF LAND, OUT OF THE ED S. JONES SURVEY, ABSTRACT NO. 574, CORYELL COUNTY, TEXAS AND BEING PART OF AN 87.0 ACRE TRACT OF LAND, AS CONVEYED TO GEORGIA A. McLENDON MORRIS IN VOLUME 402, PAGE 52 IN THE OFFICIAL PUBLIC RECORDS OF CORYELL COUNTY, AND BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS:

BEGINNING at an 3/8 inch iron rod found for the most eastern corner of the 87.0 acre Tract, and also being on the southern right-of-way line of F.M. 1113, from which points a 3/8 inch iron rod found on the northern property line of the 87.0 acre Tract, bears N 42° 05' 14" W, 2317.86 feet (Bearing Basis);

THENCE S 42° 13' 14" W (S 42° 05' 14" W), a distance of 75.37 (75.57) feet, to a 3/8 inch iron rod found on the northern right-of-way line of Grimes Crossing Road;

THENCE N 84° 59' 11" W (N 84°46' 39" W), a distance of 273.20 (274.25) feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a capped iron rod found labeled "Maples 5043 R.P.L.S.";

THENCE N 88° 26' 49" W (N 88°26' 19" W), a distance of 149.24 (148.71) feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a capped iron rod found labeled "Maples 5043 R.P.L.S.";

THENCE S 87° 09' 05" W (S 86°36' 01" W), a distance of 8.91 feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a set iron rod;

THENCE N 47° 46' 46" W, a distance of 386.38 feet parallel to the northern property line of the 87.0 acre Tract, to a set iron rod;

THENCE N 42° 13' 14" E, a distance of 336.46 feet, to a set iron rod on the northern property line of the 87.0 acre Tract;

THENCE S 48° 23' 16" E, along and with the common property line of the 87.0 acre Tract and the southern right-of-way line of FM 1113, a distance of 723.50 feet to the **POINT OF BEGINNING**, and containing 4.60 acres, more or less.

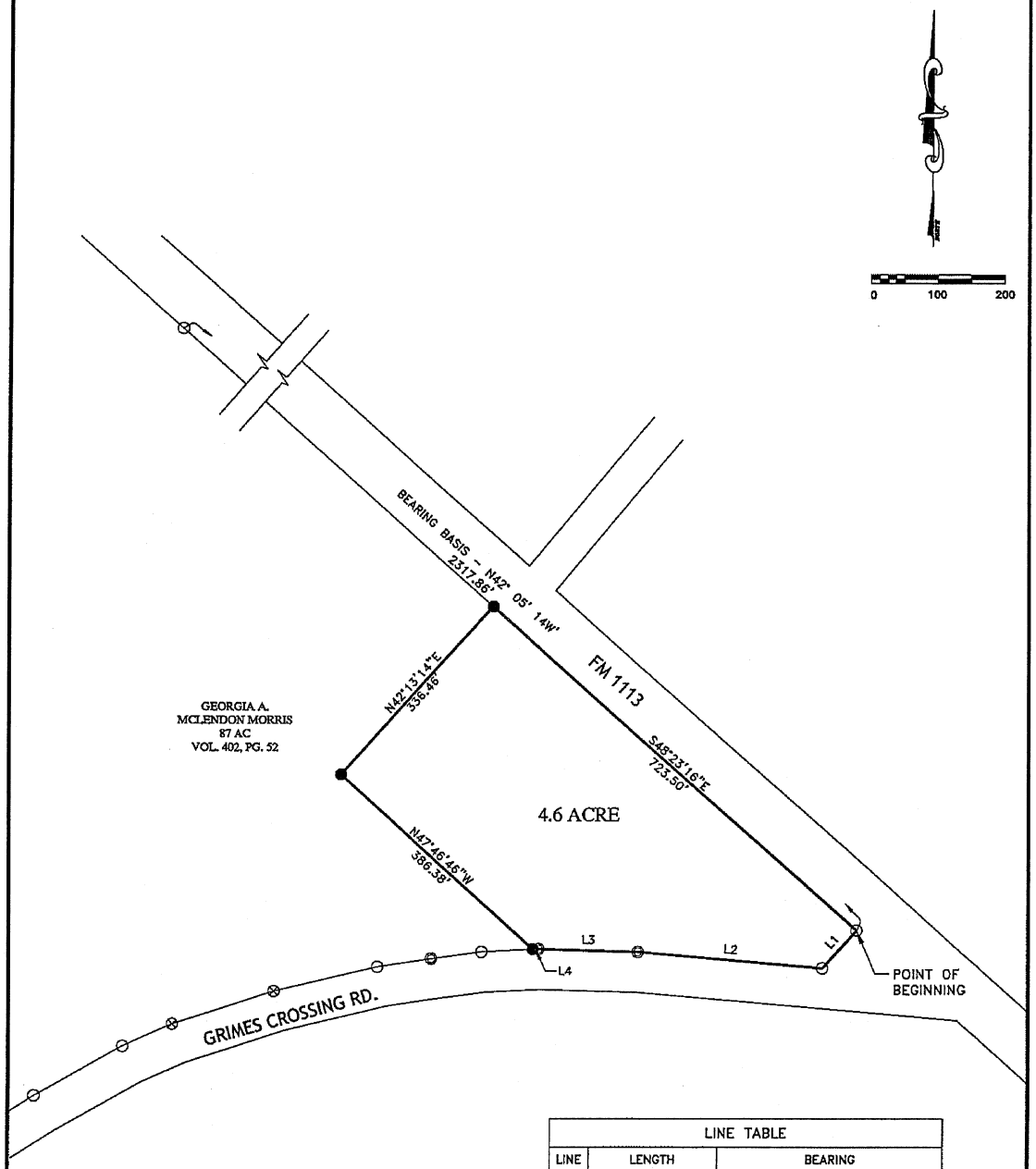
Record information is shown in parenthesis.

I, Douglas C. Hearn, a Registered Professional Land Surveyor, do hereby certify that these field notes are based on record information, supplemental field surveys, and calculations performed under my supervision in February of 2009 and are correct to the best of my knowledge and belief.

STATE OF TEXAS
REGISTERED
DOUGLAS C. HEARN
4849
PROFESSIONAL
LAND SURVEYOR

7/27/09

SKETCH TO ACCOMPANY FIELD NOTES



LINE TABLE		
LINE	LENGTH	BEARING
L1	75.37' (75.57')	S42° 13' 14"W (S42° 05' 14"W)
L2	273.20' (274.25')	N84° 59' 11"W (N84° 46' 39"W)
L3	149.24' (148.71')	N88° 26' 49"W (N88° 26' 19"W)
L4	8.91'	S87° 09' 05"W (S86° 36' 01"W)

LEGEND

- CAPPED FOUND IRON PIN
- FOUND IRON PIN
- SET IRON PIN
- DISTURBED FOUND IRON PIN
- FENCE POST
- FENCE
- EDGE OF ASPHALT

STATE OF TEXAS
REGISTERED
DOUGLAS C. HEARN
4849
PROFESSIONAL
LAND SURVEYOR

7/27/09

I, Douglas C. Hearn, a Registered Professional Land Surveyor, do hereby certify that these field notes accurately represent the result of an on-the-ground survey made under my supervision during February of 2009 and are correct to the best of my knowledge.

Hearn Engineering, Inc. * 3000 Joe DiMaggio Blvd. Ste. 25 * Round Rock, Texas 78665 * (512) 310-0176

DESCRIPTION OF A 2.2 ACRE TRACT, OF LAND OUT OF THE ED S. JONES SURVEY, ABSTRACT NO. 574, CORYELL COUNTY, TEXAS AND BEING PART OF AN 87.0 ACRE TRACT OF LAND, AS CONVEYED TO GEORGIA A. McLENDON MORRIS IN VOLUME 402, PAGE 52 IN THE OFFICIAL PUBLIC RECORDS OF CORYELL COUNTY, AND BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS:

COMMENCING at an 3/8 inch iron rod found for the most eastern corner of the 87.0 acre Tract, and also being on the southern right-of-way line of F.M. 1113, from which points a 3/8 inch iron rod found on the northern property line of the 87.0 acre Tract, bears N 42° 05' 14" W, 2317.86 feet (Bearing Basis);

THENCE S 42° 13' 14" W (S 42° 05' 14" W), a distance of 75.37 (75.57) feet, to a 3/8 inch iron rod found on the northern right-of-way line of Grimes Crossing Road;

THENCE N 84° 59' 11" W (N 84°46' 39" W), a distance of 273.20 (274.25) feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a capped iron rod found labeled "Maples 5043 R.P.L.S.";

THENCE N 88° 26' 49" W (N 88°26' 19" W), a distance of 149.24 (148.71) feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a capped iron rod found labeled "Maples 5043 R.P.L.S.";

THENCE S 87° 09' 05" W (S 86°36' 01" W), a distance of 8.91 feet along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, to a set iron rod for the **POINT OF BEGINNING**;

THENCE along and with the common property line of the 87.0 acre Tract and the northern right-of-way line of Grimes Crossing Road, the following courses:

S 87° 09' 05" W (S 86°36' 01" W), 76.14 feet to an iron rod found;

S 82° 19' 16" W (S 82°51' 33" W), 75.01 (74.24) feet to an iron rod found;

S 81° 23' 14" W (S 80°59' 19" W), 81.82 (82.85) feet to an iron rod found;

S 76° 45' 31" W (S 76° 38' 54" W), 158.61 (158.48) feet to a disturbed iron rod found;

S 71° 59' 50" W (S 71° 55' 16" W), 158.30 (158.50) feet to a disturbed iron rod found;

S 66° 08' 29" W (S 66° 17' 23" W), 81.61 (81.22) feet to an iron rod found;

S 60° 50' 38" W (S 60° 45' 10" W), 97.01 feet to a set iron rod;

THENCE N 42° 13' 14" E, a distance of 609.30 feet to a set iron rod,

THENCE S 47° 46' 46" E, a distance of 386.38 feet to the **POINT OF BEGINNING**, and containing 2.2 acres, more or less.

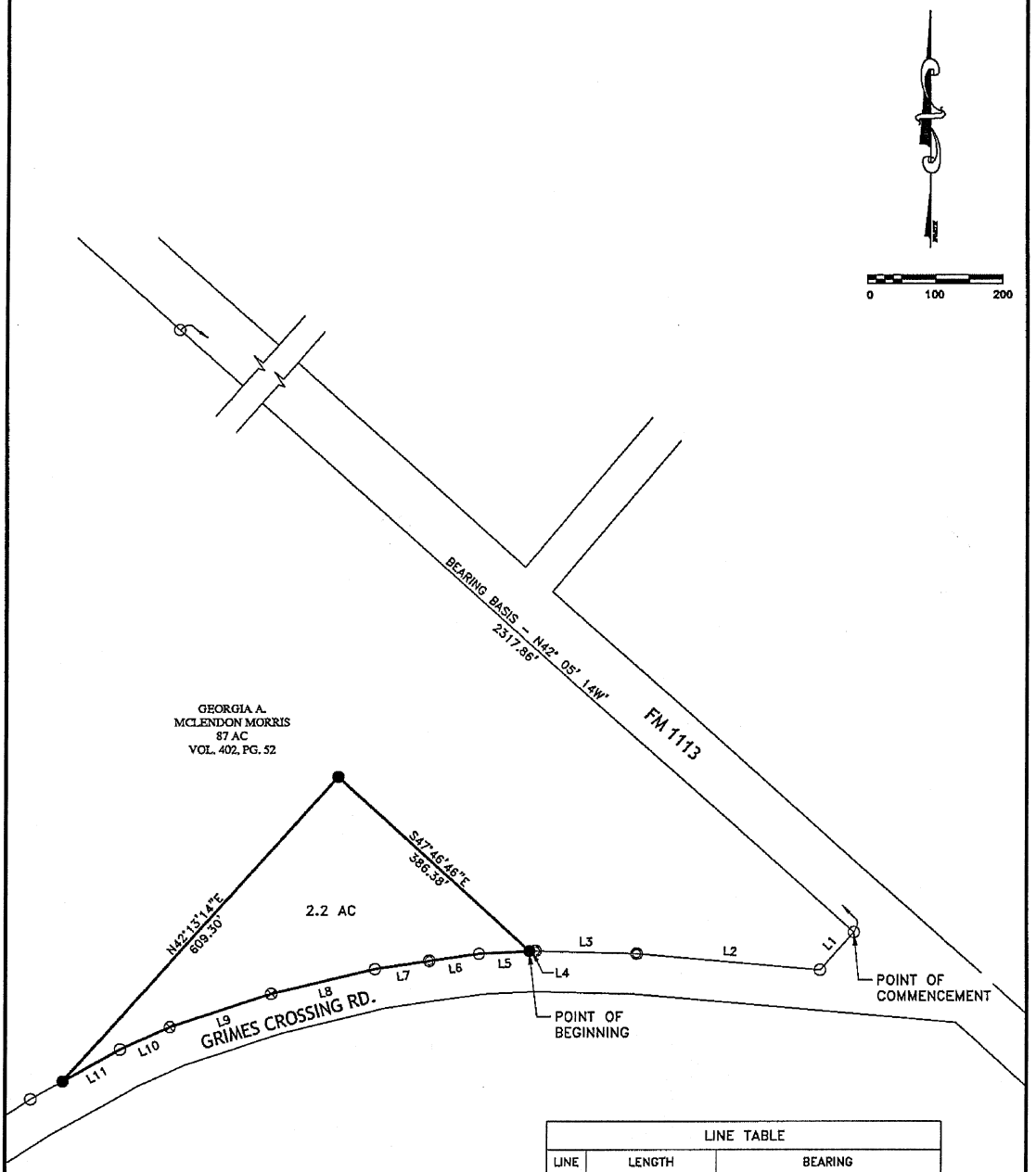
Record information is shown in parenthesis.

I, Douglas C. Hearn, a Registered Professional Land Surveyor, do hereby certify that these field notes are based on record information, supplemental field surveys, and calculations performed under my supervision in July of 2009 and are correct to the best of my knowledge and belief.

STATE OF TEXAS
REGISTERED
DOUGLAS C. HEARN
4849
PROFESSIONAL
LAND SURVEYOR

7/27/09

SKETCH TO ACCOMPANY FIELD NOTES



LINE TABLE		
LINE	LENGTH	BEARING
L1	75.37' (75.57')	S42° 13' 14"W (S42° 05' 14"W)
L2	273.20' (274.25')	N84° 59' 11"W (N84° 46' 39"W)
L3	149.24' (148.71')	N88° 26' 49"W (N88° 26' 19"W)
L4	8.91'	S87° 09' 05"W (S86° 36' 01"W)
L5	76.14'	S87° 09' 05"W (S86° 36' 01"W)
L6	75.01' (74.24')	S82° 19' 16"W (S82° 51' 33"W)
L7	81.82' (82.85')	S81° 23' 14"W (S80° 59' 19"W)
L8	158.61' (158.48')	S76° 45' 31"W (S76° 38' 54"W)
L9	158.30' (158.50')	S71° 59' 50"W (S71° 55' 16"W)
L10	81.61' (81.22')	S66° 08' 29"W (S66° 17' 23"W)
L11	97.01'	S60° 50' 38"W (S60° 45' 10"W)

7/21/09

STATE OF TEXAS
REGISTERED
DOUGLAS C. HEARN
4849
PROFESSIONAL
LAND SURVEYOR

LEGEND

- CAPPED FOUND IRON PIN
- FOUND IRON PIN
- SET IRON PIN
- DISTURBED FOUND IRON PIN
- FENCE POST
- —x— FENCE
- EDGE OF ASPHALT

I, Douglas C. Hearn, a Registered Professional Land Surveyor, do hereby certify that these field notes accurately represent the result of an on-the-ground survey made under my supervision during July of 2009 and are correct to the best of my knowledge.

Hearn Engineering, Inc. * 3000 Joe DiMaggio Blvd. Ste. 25 * Round Rock, Texas 78665 * (512) 310-0176

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. H-5

Contact – Wesley Wright, P.E., City Engineer (254-547-0751)
wwright@ci.copperas-cove.tx.us

SUBJECT: **Public hearing on the annexation of 155.8906 acres of land in Coryell County, Texas being owned by the Copperas Cove Economic Development Corporation and generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove.**

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1. BACKGROUND/HISTORY

On July 23, 2010, the Copperas Cove Economic Development Corporation submitted the attached "Petition for Annexation of Sparsely Occupied Areas by the Owner of the Area" for 155.8906 acres of land generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove.

On August 3, 2010, the City Council accepted the petition for annexation and set two public hearing dates and times (August 5, 2010 at 6 pm and August 17, 2010 at 7 pm).

On August 5, 2010, the City Council conducted the first of two required public hearings giving persons interested in the annexation an opportunity to be heard.

2. FINDINGS/CURRENT ACTIVITY

Local government code requires "two public hearings at which persons interested in the annexation are given the opportunity to be heard." All notice requirements have been met.

3. FINANCIAL IMPACT

None.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends the City Council conduct the second and final required public hearing for annexing 155.8906 acres of land currently owned by the Copperas Cove Economic Development Corporation generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove.

Request for Voluntary Annexation of Sparsely Populated Area by the Owner of Area

TO THE HONORABLE MAYOR AND CITY COUNCIL
OF THE CITY OF COPPERAS COVE, TEXAS:

The undersigned owner of the hereinafter described tract of land, pursuant to the Texas Local Government Code § 43.028, hereby petitions the City of Copperas Cove to extend the present City Limits so as to include as a part of the City that certain tract of land described in Exhibit "A" attached hereto and made a part hereof: Copies of the deeds showing current ownership of the property are attached.

The undersigned owner hereby certifies that:

(1) The tract of land described in Exhibit "A" is located contiguous and adjacent to the existing corporate limits of the City of Copperas Cove, Texas; and
(2) The tract of land described in Exhibit "A" is one-half (1/2) mile or less in width; and
(3) The tract of land described in Exhibit "A" is vacant and without residents, or on which less than three (3) qualified voters reside: and
(4) This petition is signed and duly acknowledged by each and every individual or corporation having a proprietary interest in said land.

7-22-10

Dan Yancey, Chairman
Copperas Cove Economic Development Corporation
Board of Directors

Date

ACKNOWLEDGEMENT

STATE OF TEXAS §
COUNTY OF Coryell §

This instrument was acknowledged before me on the 22nd day of July, 2010, by Dan Yancey.

Linda Hight
Notary Public, State of Texas

NOTARY PUBLIC STATE OF TEXAS
Linda Hight
My Commission Expires
04/25/2012

VOLUNTARY ANNEXATION PETITION – APPLICATION & CHECKIST

(Please Print Clearly)

Name of Applicant: Copperas Cove Economic Development Corporation
Date of Submittal: July 23, 2010
Proposed Acreage to be Annexed: 155.8986 acres

INSTRUCTIONS

- Fill out the following application and checklist completely prior to submission
- Place a check mark on each line when you have complied with that item

REQUIRED ITEMS FOR SUBMITTAL PACKAGE:

The following items must be included in order for the Annexation Application to be accepted

✓ 1. Completed annexation petition with each owner's original signature. Must include all owners' signatures if there are multiple owners of record.

✓ 2. Completed annexation application with separate owner's sheet for each owner of record

✓ 3. A copy of the deed showing current ownership

✓ 4. A clear and legible copy of certified field notes (metes and bounds) describing the boundary of the property that is being petitioned for annexation with a graphic exhibit (map or plat) clearly showing the property. If the property is a subdivided lot, please submit a copy of the recorded subdivision plat.

✓ 5. Number of property owners to be notified: 12
A computer print out from the appraisal district listing property owners located within 200 feet of the boundaries of the subject property, and from that a location map and key showing the notification boundaries and numbered key listing the names and mailing address of those to be notified

DO NOT WRITE BELOW THIS LINE – OFFICIAL USE ONLY

Annexation Petition(s) ☐ Completed Application ☐ Application Fee ☐

Owner's Sheet(s) ☐ Ownership Deed ☐ Boundary Description ☐

This application meets the Planning Department's requirements for processing:

Accepted By: _____ *Date:* _____

PROPERTY INFORMATION:

Property Address or Description: W of current City limits, S of 190, E ½ N of Kelleyer Route ROW

Total Number of Acres: 155.8906 Total Number of Tracts: 3

Lot(s): n/a Blocks: n/a Subdivision: n/a

Survey Name and Abstract Number: see separate sheet, attached

Current Land Use: Undeveloped

Proposed Land Use and Purpose of Annexation: commercial & industrial development

List of all qualified voting age persons living on each tract of land. *Per state law, in order for an area to be eligible for annexation by petition of the land owners, the area must be vacant or inhabited by fewer than three (3) qualified voters.*

Tract #	Name	Mailing Address
none		

Voluntary Annexation
Copperas Cove EDC Property to City of Copperas Cove

Survey Names and Abstract Numbers

D.D. Thompson Survey, Abstract 1041

A.G. Mathews Survey, Abstract 1765

James A. Wells Survey, Abstract 1065

C.G. Bennett Survey, Abstract 1680

Wm. P. Hardeman Survey, Abstract 454

Richard Hallmark Survey, Abstract 466

In Coryell County, Texas

OWNERS INFORMATION:

(Please fill out a separate sheet for each owner of record) (Please Print)

Copperas Cove EDC contacts: Dan Yancey, Polo Enriquez, Monica Hull

Owner's Name *(If the property ownership is in the name of a partnership, corporation, joint venture, trust o other entity, please list the official name of the entity and the name of the managing partner.)*

210 S 1st St Copperas Cove TX 76522

Owner's Mailing Address City State Zip

254.547.7874 254.423.1523 254.547.7388

Owner's Phone Mobile Fax Email

polo.enriquez@copperascove-edc.com

Agent Authorization:

Please check one of the following:

✓ I will represent my petition before City Staff and the City Council of the City of Copperas Cove

____ I hereby authorize the person named below to act as my agent in representing this application before the City Staff and the City Council of the City of Copperas Cove

Note: The agent is the official contact person for this project and the single point of contact. All correspondence and communication will be conducted with the agent. If no agent is listed the owner will be considered the agent.

(Please Print)

Agent's Name Company Name (if applicable)

Agent's Mailing Address City State Zip

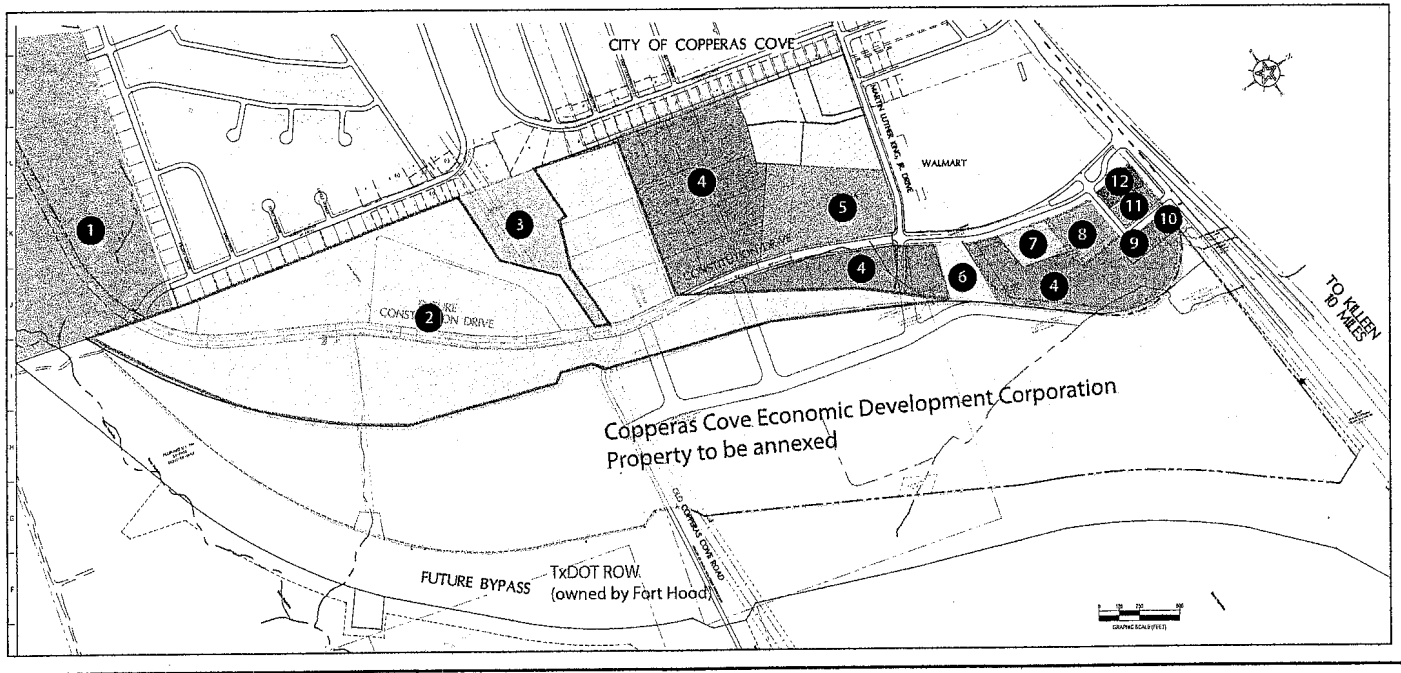
Agent's Phone Mobile Fax Email

If an agent is representing the owner of the property, please complete the following information:

I hereby authorize the person named above to act as my agent in processing this application before the City Council of the City of Copperas Cove, Texas:

Owner's Signature: _____

Date: _____



Copperas Cove EDC Voluntary Annexation Map Key

Property number	Owner Name	Company Name	Address1	Address2	City, State, Zip
1	Jay Manning	Manning Homes	2425 E Hwy 190		Copperas Cove, TX 76522
2		Copperas Cove EDC	210 S 1st St		Copperas Cove, TX 76522
3	Oncor Electric Delivery	c/o State & Local Tax Department	PO Box 219071		Dallas, TX 75221-9071
4		Copperas Cove Industrial Foundation	PO Box 727		Copperas Cove, TX 76522
5	Jeff Benson	Cinergy Cinemas	1311 N Central Exp	Suite 336	Dallas, TX 75243
6 (Days Inn)		Sargam Inc	341 Constitution Dr		Copperas Cove, TX 76522
7 (Best Western)		Golden Royal, Inc	321 Constitution Dr		Copperas Cove, TX 76522
8 (Cove Retail Center)		Magenta Sky Capital, LTD	PO Box 64189		Lubbock, TX 79464
9 (East Pointe Center)		James Wright 2000 Trust	3106 S WS Young Dr	Suite 402	Killeen, TX 76542
10 (Arby's)		Foods, Inc - Arby's Roast Beef ATTN: Jon Parnell	411 Oakridge Rd		Georgetown, TX 78628
11 (Wendy's)		CTW LLC	PO Box 7657		Waco, TX 76714
12 (Casa Ole)		Spirit SPE Portfolio 2004-6 LLC	3609 Smith Barry Rd		Pantego, TX 76013

Walker Partners
ENGINEERS • SURVEYORS

EXHIBIT "A"

APPROXIMATELY 155 ACRES
FOR VOLUNTARY ANNEXATION
INTO THE CITY OF COPPERAS COVE, CORYELL COUNTY, TEXAS

DESCRIPTION OF APPROXIMATELY 155 ACRES OF LAND LOCATED IN THE D.D. THOMPSON SURVEY, ABSTRACT 1041, A.G. MATHEWS SURVEY, ABSTRACT 1765, JAMES A. WELLS SURVEY, ABSTRACT 1065, C.G. BENNETT SURVEY, ABSTRACT 1680, WM. P. HARDEMAN SURVEY, ABSTRACT 454, AND THE RICHARD HALLMARK SURVEY, ABSTRACT 466, IN CORYELL COUNTY, TEXAS, SAID 155 ACRE TRACT BEING ALL OF PART 1 - CALLED 128.48 ACRES, ALL OF PART 2 - CALLED 0.6490 ACRE AND ALL OF PART 3 - CALLED 0.0216 ACRE COMPRISING A CALLED 129.1506 ACRE TRACT AS DESCRIBED IN EXHIBIT "A" IN A DEED TO THE COPPERAS COVE ECONOMIC DEVELOPMENT CORPORATION RECORDED UNDER CORYELL COUNTY CLERK'S DOCUMENT(C.C.C.D.) 236889 IN THE OFFICIAL PUBLIC RECORDS OF CORYELL COUNTY, TEXAS (O.P.R.C.C.T.), ALSO BEING A PORTION OF "TRACT ONE" CALLED 12.87 ACRES AS DESCRIBED IN EXHIBIT "A" AND A PORTION OF "TRACT TWO" CALLED 13.97 ACRES AS DESCRIBED IN "EXHIBIT "B" IN A DEED TO THE COPPERAS COVE ECONOMIC DEVELOPMENT CORPORATION RECORDED UNDER C.C.C.D. 190990 OF THE O.P.R.C.C.T. SAID 155 ACRE TRACT BEING SHOWN ON THE ATTACHED EXHIBIT DRAWING AND FURTHER DESCRIBED BY RECORD CALLS AS FOLLOWS:

BEGINNING AT A TEXAS DEPARTMENT OF TRANSPORTATION'S (TXDOT) BRASS CAP MONUMENT STAMPED "STA 197+35.85 - 208.19 LT" FOUND IN THE PROPOSED NORTH RIGHT-OF-WAY LINE OF THE FUTURE EXTENSION OF U.S. 190 BY-PASS HIGHWAY AT ITS INTERSECTION WITH THE EAST LINE OF THE REMAINDER OF A CALLED 370.3 ACRE TRACT DESCRIBED IN A DEED TO JAY MANNING AND JOAN MANNING RECORDED UNDER C.C.C.D. 182714 OF THE O.P.R.C.C.T., MARKING THE MOST SOUTHERLY OR SOUTHWEST CORNER OF A CALLED 87.21 ACRE TRACT DESCRIBED AS "TRACT THREE" IN EXHIBIT "C" IN THE ABOVE-MENTIONED DEED TO THE COPPERAS COVE ECONOMIC DEVELOPMENT CORPORATION RECORDED UNDER C.C.C.D. 190990 OF THE O.P.R.C.C.T., ALSO MARKING THE MOST SOUTHERLY OR SOUTHWEST CORNER OF THE ABOVE-MENTIONED 128.48 ACRE TRACT AND THE HEREIN DESCRIBED TRACT;

THENCE WITH THE WEST LINE OF THE SAID 128.48 ACRE TRACT ALONG THE BEARINGS AND DISTANCES CITED IN SAID DEED OF THE 128.48 ACRE TRACT, SAME BEING THE EXISTING CORPORATE LIMITS OF THE CITY OF COPPERAS COVE THE FOLLOWING NINE (9) CALLS:

1) **AN ARC DISTANCE OF 2102.20'** WITH A CURVE TO THE LEFT HAVING A RADIUS OF 3639.72' AND A CHORD OF N 51°15'21" E – 2073.10' TO A POINT OF NON-TANGENCY,
2) **N 20°16'20" E – 955.65'** TO AN ANGLE POINT,
3) **N 32°20'32" W – 65.60'** TO AN ANGLE POINT,
4) **N 20°32'50" E – 197.01'** TO AN ANGLE POINT,
5) **N 57°41'46" E – 83.85'** TO AN ANGLE POINT,
6) **N 20°14'24" E – 782.94'** TO A POINT OF CURVATURE,
7) **AN ARC DISTANCE OF 1598.36'** WITH A CURVE TO THE RIGHT HAVING A RADIUS OF 5069.65' AND A CHORD OF N 29°16'25" E – 1591.75' TO A POINT OF TANGENCY,
8) **N 42°21'13" E – 792.44'** TO A POINT OF CURVATURE,
9) **AN ARC DISTANCE OF 956.63'** WITH A CURVE TO THE LEFT HAVING A RADIUS OF 404.37' AND A CHORD OF N 25°25'01" W – 748.65' TO A POINT IN THE EXISTING SOUTH RIGHT-OF-WAY LINE OF U.S. HIGHWAY 190, BEING THE NORTHWEST CORNER OF THE 128.48 ACRES AND THE HEREIN DESCRIBED TRACT;

THENCE N 86°37'37" E – 1902.52' (BEARING AND DISTANCE CITED IN SAID DEED OF THE 128.48 ACRE TRACT) LEAVING SAID CORPORATE LIMITS WITH SAID SOUTH LINE OF U.S. HIGHWAY 190 RIGHT-OF-WAY, SAME BEING THE NORTH LINE OF THE SAID 128.48 ACRE TRACT TO A POINT IN THE WEST CUT-BACK LINE OF THE ABOVE-MENTIONED PROPOSED FUTURE EXTENSION OF U.S. 190 BY-PASS, SAID POINT BEING THE NORTHEAST CORNER OF THE SAID 128.48 ACRE TRACT AND THE HEREIN DESCRIBED TRACT;

THENCE S 21°38'45" E – 266.14' (BEARING AND DISTANCE CITED IN SAID DEED OF THE 128.48 ACRE TRACT) WITH SAID CUT-BACK LINE TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 280+09.21 - 223.87 LT" FOUND MARKING AN ANGLE POINT IN THE WEST LINE OF SAID PROPOSED U.S. 190 BY-PASS RIGHT-OF-WAY;

600 AUSTIN AVENUE, SUITE 20 • WACO, TEXAS • 76701
PHONE: 254-714-1402 • FAX: 254-714-0402

THENCE WITH THE WEST RIGHT-OF-WAY LINE OF THE PROPOSED FUTURE EXTENSION OF U.S. 190 BY-PASS ALONG THE BEARINGS AND DISTANCES SHOWN ON PLANS PROVIDED BY THE TEXAS DEPARTMENT OF TRANSPORTATION FOR THE PROPOSED WIDENING OF UNITED STATES HIGHWAY 190 AND THE PROPOSED U.S. 190 BY-PASS RIGHT-OF-WAY (DATED 09-20-03) THE FOLLOWING TWELVE (12) CALLS:

1) **S 41°10'52" W – 538.12'** TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 275+00 - 160.00 LT" FOUND MARKING A POINT OF CURVATURE OF A NON-TANGENT CURVE TO THE LEFT,
2) **AN ARC DISTANCE OF 1213.29'** WITH SAID CURVE TO THE LEFT HAVING A RADIUS OF 3990.07' AND A CHORD WHICH BEARS S 35°27'44" W – 1208.62' TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 263+35.36 - 160.00 LT" FOUND MARKING THE POINT OF TANGENCY,
3) **S 26°45'04" W – 219.70'** TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 261+15.65 - 160.00 LT" FOUND MARKING AN ANGLE POINT,
4) **S 30°48'11" W – 1857.12'** TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 242+63.17 - 291.23 LT" FOUND MARKING A POINT OF CURVATURE OF A CURVE TO THE LEFT,
5) **AN ARC DISTANCE OF 115.60'** WITH SAID CURVE TO THE LEFT HAVING A RADIUS OF 3110.00' AND A CHORD WHICH BEARS S 29°44'18" W – 115.59' TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 241+47.73 - 297.25 LT" FOUND MARKING AN ANGLE POINT AT THE NORTH CUT-BACK LINE OF OLD COPPERAS COVE ROAD,
6) **S 61°47'20" W – 151.14'** WITH SAID CUT-BACK LINE TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 240+23.98 - 384.02 LT" FOUND MARKING THE END OF SAID CUT-BACK LINE,
7) **S 23°19'31" W – 173.91'** CROSSING OLD COPPERAS COVE ROAD TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 238+50.39 - 373.63 LT" FOUND MARKING AN ANGLE POINT AT THE SOUTH CUT-BACK LINE OF OLD COPPERAS COVE ROAD,
8) **S 19°07'44" E – 113.18'** WITH SAID CUT-BACK LINE TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 237+71.60 - 292.39 LT" FOUND MARKING THE END OF SAID CUT-BACK LINE,
9) **S 25°04'32" W – 675.94'** TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 230+57.67 - 234.72 LT" FOUND MARKING A POINT OF CURVATURE OF A CURVE TO THE RIGHT,
10) **AN ARC DISTANCE OF 700.35'** WITH SAID CURVE TO THE RIGHT HAVING A RADIUS OF 1890.00' AND A CHORD WHICH BEARS S 35°41'28" W – 696.35' TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 223+21.26 - 160.00 LT" FOUND MARKING THE POINT OF COMPOUND CURVATURE,
11) **AN ARC DISTANCE OF 1525.11'** WITH SAID CURVE TO THE RIGHT HAVING A RADIUS OF 3245.00' AND A CHORD WHICH BEARS S 61°28'29" W – 1511.11' TO A TXDOT BRASS CAP MONUMENT STAMPED "STA 207+20.95 - 160.00 LT" FOUND MARKING THE POINT OF TANGENCY,
12) **S 77°44'23" W – 986.28'** TO THE POINT OF BEGINNING AND CONTAINING APPROXIMATELY 155 ACRES OF LAND.

THIS DOCUMENT WAS PREPARED UNDER 22 TAC 663.21, DOES NOT REFLECT THE RESULTS OF AN ON THE GROUND SURVEY, AND IS NOT TO BE USED TO CONVEY OR ESTABLISH INTERESTS IN REAL PROPERTY EXCEPT THOSE RIGHTS AND INTERESTS IMPLIED OR ESTABLISHED BY THE CREATION OR RECONFIGURATION OF THE BOUNDARY OF THE POLITICAL SUBDIVISION FOR WHICH IT WAS PREPARED.

COMPILED ON JULY 7, 2010 FROM SURVEYS PERFORMED DURING 2008 AND 2010 AND FROM RECORD DOCUMENTS ON JULY 1, 2010.

KEVIN R. HESSEL, R.P.L.S. 5344

STATE OF TEXAS
REGISTERED
KEVIN R. HESSEL
5344
PROFESSIONAL
LAND SURVEYOR

PROJ NO. 2-01412
PLAT NO. B1-0174
FIELD NOTE NO. 2-01412-FN-01
MAP CHECKED BY KRH

EXHIBIT "A"

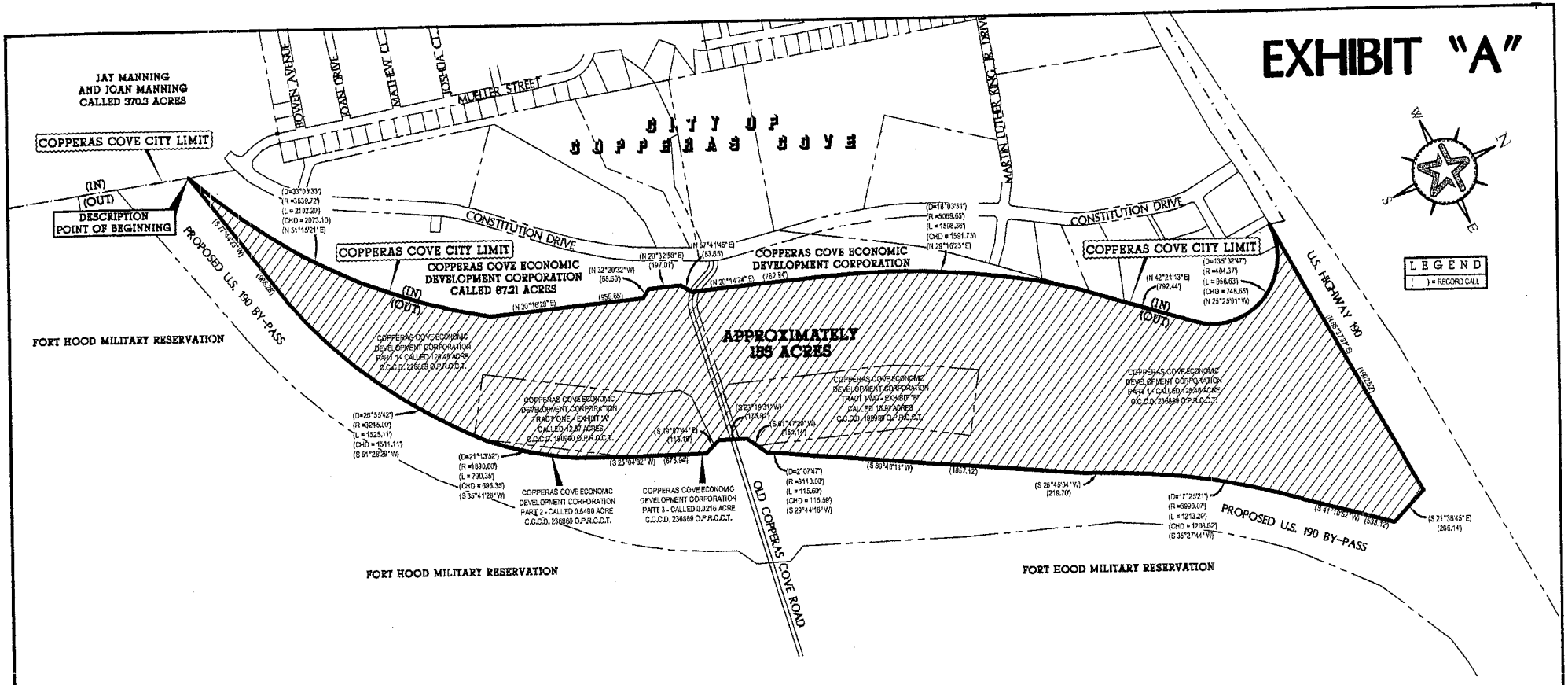


EXHIBIT OF
APPROXIMATELY 155 ACRES
FOR VOLUNTARY ANNEXATION
INTO THE CITY OF COPPERAS COVE, CORYELL COUNTY, TEXAS

PREPARED: JULY 7, 2010

KEVIN R. HESSEL, R.P.L.S. 5344

STATE OF TEXAS
REGISTERED
KEVIN R. HESSEL
5344
PROFESSIONAL
LAND SURVEYOR

NOTE: THIS DRAWING WAS PREPARED UNDER 22 TAC 663.21, DOES NOT REFLECT THE RESULTS OF AN ON THE GROUND SURVEY, AND IS NOT TO BE USED TO CONVEY OR ESTABLISH INTERESTS IN REAL PROPERTY EXCEPT THOSE RIGHTS AND INTERESTS IMPLIED OR ESTABLISHED BY THE CREATION OR RECONFIGURATION OF THE BOUNDARY OF THE POLITICAL SUBDIVISION FOR WHICH IT WAS PREPARED.

DESCRIPTION ATTACHED HERETO MADE A PART HEREOF AND TITLED:
APPROXIMATELY 155 ACRES FOR VOLUNTARY ANNEXATION INTO THE CITY OF COPPERAS COVE, CORYELL COUNTY, TEXAS.

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Walker Partners
ENGINEERS • SURVEYORS
600 AUSTIN AVENUE, SUITE 20 • WACO, TEXAS 76701
PHONE: 1-254-714-1402 • T.B.P.E. REGISTRATION NO. 8053

0 300 600 1200
GRAPHIC SCALE IN FEET

REVISIONS

PLAT NO. B1-0174 DRAFT DATE 07-05-10 FB/PG NA
PROJ. NO. 2-01412 TAB NO. NA FIELD NOTE NO. 01
DWG. NAME 2-01412MSTR.DWG DRAWN BY KRH

236889

General Warranty Deed

COPY

Date: May 14, 2010

Grantor: City of Copperas Cove, a municipal corporation

Grantor's Mailing Address:

City of Copperas Cove
507 S Main Street
Copperas Cove, Texas 76522
Coryell County

Grantee: Copperas Cove Economic Development Corporation, a Texas corporation

Grantee's Mailing Address:

Copperas Cove Economic Development Corporation
210 S. 1st Street
Copperas Cove, Texas 76522
Coryell County

Consideration:

Ten and no/100 dollars ($10.00) and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged.

Property (including any improvements):

BEING 128.48 acres or 5,596,710 square feet of land being a portion of the following tracts of land described in a Deed dated August 28, 1943 to United States of America, recorded in Volume 146, page 410, Deed Records of Coryell County, Texas, Deed dated October 27, 1943 to United States of America, recorded in Volume 147, page 270, Deed Records of Coryell County, Texas, Deed dated August 27, 1943 to United States of America, recorded in Volume 146, page 411, Deed Records of Coryell County, Texas, Deed dated August 20, 1943 to United States of America, recorded in Volume 146, page 363, Deed Records of Coryell County, Texas, Deed dated November 9, 1943 to United States of America, recorded in Volume 146, page 517, Deed Records of Coryell County, Texas, and Deed dated April 15, 1943 to United States of America, recorded in Volume 143, page 571, Deed Records of Coryell County, Texas, located in the Richard Hallmark Survey, Abstract No. 466, the Wm. P. Hardeman Survey, Abstract 454, the C. G. Bennett Survey, Abstract No. 1680, the J. A. Wells Survey, Abstract No. 1065, the A. G. Matthews Survey, Abstract No. 1765 and the D. D. Thompson Survey, Abstract No. 1041, Coryell County, Texas and being more particularly described by metes and bounds on EXHIBIT "A" attached hereto and made a part hereof for all purposes.

Reservations from Conveyance:

None

Exceptions to Conveyance and Warranty:

Validly existing easements, rights-of-way, and prescriptive rights, whether of record or not; all presently recorded and validly existing instruments, other than conveyances of the surface fee estate, that affect the Property; and taxes for 2010, which Grantee assumes and agrees to pay, and subsequent assessments for that and prior years due to change in land usage, ownership, or both, the payment of which Grantee assumes.

Grantor, for the Consideration and subject to the Reservations from Conveyance and the

Exceptions to Conveyance and Warranty, grants, sells, and conveys to Grantee the Property, together with all and singular the rights and appurtenances thereto in any way belonging, to have and to hold it to Grantee and Grantee's heirs, successors, and assigns forever. Grantor binds Grantor and Grantor's heirs and successors to warrant and forever defend all and singular the Property to Grantee and Grantee's heirs, successors, and assigns against every person whomsoever lawfully claiming or to claim the same or any part thereof, except as to the Reservations from Conveyance and the Exceptions to Conveyance and Warranty.

When the context requires, singular nouns and pronouns include the plural.

City of Copperas Cove, a municipal corporation.

John Hull, Mayor

Attest:

Jane Lees, City Secretary

STATE OF TEXAS)

COUNTY OF CORYELL)

This instrument was acknowledged before me on May 20, 2010, by John Hull, in his capacity as the Mayor of City of Copperas Cove, a municipal corporation, on behalf of said corporation.

TANYA K. McMILLAN
Notary Public, State of Texas
My Commission Expires
September 18, 2010

Notary Public, State of Texas
My commission expires: _____

PREPARED IN THE OFFICE OF:

Joe Carothers, Attorney
401 S Main
Copperas Cove, TX 76522
Tel: (254) 547-7010
Fax: (254) 542-1619

AFTER RECORDING RETURN TO:

Copperas Cove Economic Development Coporation
210 S. 1st Street
Copperas Cove, Texas 76522

COPPERAS COVE TRACT
FORT HOOD
129.1506 ACRES

PART 1

FIELD NOTES FOR 128.48 ACRES OR 5,596,710 SQUARE FEET OF LAND BEING A PORTION OF THE FOLLOWING TRACTS OF LAND DESCRIBED IN A DEED DATED AUGUST 28, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 146, PAGE 410, DEED RECORDS OF CORYELL COUNTY TEXAS (D.R.C.C.T.), DEED DATED OCTOBER 27, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 147, PAGE 270 D.R.C.C.T., DEED DATED AUGUST 27, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 146, PAGE 411 D.R.C.C.T., DEED DATED AUGUST 20, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 146, PAGE 363 D.R.C.C.T., DEED DATED NOVEMBER 9, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 146, PAGE 517 D.R.C.C.T. AND DEED DATED APRIL 15, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 143, PAGE 571 D.R.C.C.T., LOCATED IN THE RICHARD HALLMARK SURVEY, ABSTRACT NO. 466, THE WM. P. HARDEMAN SURVEY, ABSTRACT 454, THE C. G. BENNETT SURVEY, ABSTRACT 1680, THE J. A. WELLS SURVEY, ABSTRACT 1065, THE A. G. MATTHEWS SURVEY, ABSTRACT 1765 AND THE D. D. THOMPSON SURVEY, ABSTRACT 1041, CORYELL COUNTY, TEXAS.

COMMENCING at a 3-inch iron rod in concrete found for the northwest corner of a called 235.003 acre tract as described in a deed dated September 20, 1990 to JWC, Inc. and the southwest corner of said Volume 146, Page 410, being on the easterly line of a called 376 acre tract as described in deed dated March 14, 1974 to Curtis Manning, et ux;

THENCE North 17 degrees 34 minutes 01 seconds East, along easterly line of said Manning tract and the westerly line of said Volume 146, Page 410 passing at a distance of 247.16 feet a TxDOT Type II monument found on the proposed southeasterly right-of-way line of U.S. Highway 190, as shown on plans for CSJ:0231-02-044 dated October 9, 2003, in all a total distance of 701.57 feet to a TxDOT Type II monument found for the south corner and **POINT OF BEGINNING** of the herein described tract, being the most southerly corner of a called 87.21 acre tract as described in deed dated September 24, 2003 to City of Copperas Cove, Texas recorded in File No. 167945 Official Records of Coryell County, Texas (O.R.C.C.T.), being on the westerly line of said Volume 146, Page 410, on the easterly line of said Manning tract and on the proposed northwesterly right-of-way line of said Proposed U.S. Highway 190, being the beginning of a curve to the left which center bears North 22 degrees 11 minutes 53 seconds West;

THENCE in a northeasterly direction, along the easterly line of said 87.21 acre tract and with said curve to the left, having a radius of 3,639.72 feet, an arc length of 2,102.20 feet, a central angle of 33 deg. 05 min. 33 sec., and a chord which bears North 51 deg. 15 min. 21 sec. East 2,073.10 feet, to a TxDOT Type II monument found for the end of said curve;

THENCE North 20 degrees 16 minutes 20 seconds East, continuing along the easterly line of said 87.21 acre tract, a distance of 955.65 feet to a TxDOT Type II monument found for an angle point of the easterly line of said 87.21 acre tract;

THENCE North 32 degrees 20 minutes 32 seconds West, continuing along the easterly line of said 87.21 acre tract, a distance of 65.60 feet to a TxDOT Type II monument found for an angle point of the easterly line of said 87.21 acre tract;

THENCE North 20 degrees 32 minutes 50 seconds East, continuing along the easterly line of said 87.21 acre tract, a distance of 197.01 feet to a TxDOT Type II monument found for an angle point of the easterly line of said 87.21 acre tract;

THENCE North 57 degrees 41 minutes 46 seconds East, continuing along the easterly line of said 87.21 acre tract, a distance of 83.85 feet to a TxDOT Type II monument found for an angle point of the easterly line of said 87.21 acre tract;

THENCE North 20 degrees 14 minutes 24 seconds East, continuing along the easterly line of said 87.21 acre tract, a distance of 782.94 feet to a TxDOT Type II monument found for an angle point of the easterly line of said 87.21 acre tract, being the beginning of a curve to the right which center bears South 69 degrees 45 minutes 31 seconds East;

THENCE in a northeasterly direction, along the easterly line of said 87.21 acre tract and with said curve to the right, having a radius of 5,069.65 feet, an arc length of 1,598.36 feet, a central angle of 18 deg. 03 min. 51 sec., and a chord which bears North 29 deg. 16 min. 25 sec. East 1,591.75 feet, to a 5/8-inch iron rod with aluminum cap found for the end of said curve, being the most northerly corner of said 87.21 acre tract, being on the easterly line of Block 1 of the Copperas Cove 190 Business Park & Industrial Park Phase 2, recorded in Cabinet "A", Slide 369 of the Plat Records of Coryell County, Texas (P.R.C.C.T.);

THENCE North 42 degrees 21 minutes 13 seconds East, along the easterly line of said Block 1, passing at a distance of 132.74 feet a 3/8-inch iron rod with cap, marked WALLACE GROUP, found for the northeast corner of Lot 2 said Block 1 and the southeast corner of Lot 1 said Block 1, in all a total distance of 792.44 feet to a 3/8-inch iron rod cap, marked WALLACE GROUP, found for the beginning of a curve to the left which center bears North 47 degrees 38 minutes 37 seconds West;

THENCE in a northwesterly direction, along the easterly line of said Block 1 and with said curve to the left, having a radius of 404.37 feet, an arc length of 956.63 feet, a central angle of 135 deg. 32 min. 47 sec., and a chord which bears North 25 deg. 25 min. 01 sec. West 748.65 feet, to a TxDOT Type II monument found on the existing south right-of-way line of U.S. Highway 190, recorded in Volume 275, Page 355, D.R.C.C.T.;

THENCE North 86 degrees 37 minutes 37 seconds East, along the said existing south right-of-way line of U.S. Highway 190, a distance of 1,902.52 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set on an extension of the proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 21 degrees 38 minutes 06 seconds East, along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 266.14 feet to a TxDOT Type II monument found for an angle point on said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 41 degrees 10 minutes 38 seconds West, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, passing at a distance of 269.01 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a Point on Line (POL), in all a total distance of 538.01 feet to a TxDOT Type II monument found on said proposed northwesterly right-of-way line of U.S. Highway 190, being the beginning of a curve to the left which center bears South 45 degrees 49 minutes 24 seconds East;

THENCE in a southwesterly direction, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190 and with said curve to the left, having a radius of 3,990.07 feet, passing at an arc length of 404.46 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a Point on Curve (POC), passing at an arc length of 808.92 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POC, a total arc length of 1,213.38 feet, a central angle of 17 deg. 25 min. 25 sec., and a chord which bears South 35 deg. 27 min. 54 sec. West 1,208.71 feet, to a TxDOT Type II monument found for the end of said curve, being on the said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 26 degrees 46 minutes 16 seconds West, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 219.70 feet to a TxDOT Type II monument found for an angle point on said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 30 degrees 47 minutes 51 seconds West, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, passing at a distance of 283.56 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POL, passing at a distance of 567.12 feet a TxDOT Type II monument found for the east corner of the northerly proposed TxDOT easement 38(E), passing at a distance of 767.60 feet a TxDOT Type II monument found for the south corner of the northerly proposed TxDOT easement 38(E), passing at a distance of 1,130.85 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POL, passing at a distance of 1,494.10 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POL, in all a total distance of 1,857.35 feet to a TxDOT Type II monument found on said proposed northwesterly right-of-way line of U.S. Highway 190, being the beginning of a curve to the left which center bears South 59 degrees 22 minutes 01 seconds East;

THENCE in a southwesterly direction, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190 and with said curve to the left, having a radius of 3,110.00 feet, an arc length of 115.96 feet, a central angle of 02 deg. 08 min. 11 sec., and a chord which bears South 29 deg. 33 min. 54 sec. West 115.95 feet to a TxDOT Type II monument found for the end of said curve, being on the said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 62 degrees 04 minutes 28 seconds West, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 75.03 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a corner of the herein described tract, being on the said proposed northwesterly right-of-way line of U.S. Highway 190 and on the east line of a called 13.97 acre tract as described in deed dated September 24, 2003 to City of Copperas Cove, recorded in File No. 167945 O.R.C.C.T.;

THENCE North 20 degrees 14 minutes 33 seconds East, along the said east line of the called 13.97 acre tract, a distance of 953.30 feet to a 3/8-inch iron rod found for an angle point on the said east line of the called 13.97 acre tract;

THENCE North 34 degrees 28 minutes 00 seconds East, continuing along the said east line of the called 13.97 acre tract, a distance of 386.08 feet to a 3/8-inch iron rod with cap, marked M & ASSOC., found for northeast corner of the called 13.97 acre tract;

THENCE North 56 degrees 08 minutes 05 seconds West, along the north line of the called 13.97 acre tract, a distance of 411.83 feet to a 3/8-inch iron rod with cap, marked M & ASSOC., found for northwest corner of the called 13.97 acre tract, being the beginning of a curve to the left which center bears South 56 degrees 09 minutes 57 seconds East;

THENCE in a southwesterly direction, along the west line of the called 13.97 acre tract and with said curve to the left, having a radius of 4,270.17 feet, an arc length of 550.64 feet, a central angle of 07 deg. 23 min. 18 sec., and a chord which bears South 30 deg. 08 min. 24 sec. West 550.26 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for the end of said curve, being on the said west line of the called 13.97 acre tract;

THENCE South 20 degrees 14 minutes 31 seconds West, along the said west line of the called 13.97 acre tract, a distance of 392.33 feet to a 5/8-inch iron rod with aluminum cap found for an angle point of the said west line called 13.97 acre tract;

THENCE South 20 degrees 14 minutes 02 seconds West, along the said west line of the called 13.97 acre tract, a distance of 623.00 feet to a 5/8-inch iron rod with aluminum cap found for an angle point of the said west line called 13.97 acre tract;

THENCE South 30 degrees 41 minutes 21 seconds East, along the said west line of the called 13.97 acre tract, a distance of 60.44 feet to a 5/8-inch iron rod with aluminum cap found for the southwest corner of the called 13.97 acre tract;

THENCE South 82 degrees 26 minutes 30 seconds East, along the south line of the called 13.97 acre tract, a distance of 307.32 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set on the said Proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 23 degrees 19 minutes 42 seconds West, along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 127.00 feet to a TxDOT Type II monument found for an angle point on the said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 19 degrees 10 minutes 46 seconds East, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 39.56 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set on the said proposed northwesterly right-of-way line of U.S. Highway 190 and on the north line of a called 12.87 acre tract as described in deed dated September 24, 2003 to City of Copperas Cove, recorded in File No. 167945 O.R.C.C.T.;

THENCE North 88 degrees 33 minutes 16 seconds West, along the said north line of the called 12.87 acre tract, a distance of 330.75 feet to a 5/8-inch iron rod with aluminum cap found for the northwest corner of the called 12.87 acre tract;

THENCE South 58 degrees 05 minutes 54 seconds West, along the west line of the called 12.87 acre tract, a distance of 84.80 feet to a 5/8-inch iron rod with aluminum cap found for the an angle point on the said west line of the called 12.87 acre tract;

THENCE South 19 degrees 59 minutes 32 seconds West, along the said west line of the called 12.87 acre tract, a distance of 207.66 feet to a 5/8-inch iron rod with aluminum cap found for an angle point on the said west line of the called 12.87 acre tract;

THENCE South 33 degrees 51 minutes 32 seconds West, continuing along the west line of the called 12.87 acre tract, a distance of 966.54 feet to a 5/8-inch iron rod with aluminum cap found on the said west line of the called 12.87 acre tract, being the beginning of a curve to the right which center bears North 56 degrees 36 minutes 58 seconds West;

THENCE in a southwesterly direction, continuing along the west line of the called 12.87 acre tract and with said curve to the right, having a radius of 3,999.13 feet, an arc length of 61.96 feet, a central angle of 00 deg. 53 min. 16 sec., and a chord which bears South 33 deg. 49 min. 39 sec. West 61.96 feet to a 3/8-inch iron rod with cap, marked M & ASSOC., found for the end of said curve, being the southwest corner of the called 12.87 acre tract;

THENCE South 55 degrees 16 minutes 36 seconds East, along the southwesterly line of the called 12.87 acre tract, a distance of 382.16 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set on the said proposed northwesterly right-of-way of U.S. Highway 190, being on a curve to the right which center bears North 40 degrees 29 minutes 05 seconds West;

THENCE in a southwesterly direction, along the said proposed northwesterly right-of-way line of U.S. Highway 190 and with said curve to the right, having a radius of 3,245.00 feet, passing at an arc length of 173.46 feet a TxDOT Type II monument found for the east corner of the southerly proposed TxDOT easement 38(E), passing at an arc length of 373.52 feet a TxDOT Type II monument found for the south corner of the southerly proposed TxDOT easement 38(E), passing at a distance of 729.09 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POC, passing at an arc length of 1,084.65 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POC, a total arc length of 1,440.21 feet, a central angle of 25 deg. 25 min. 45 sec., and a chord which bears South 62 deg. 13 min. 48 sec. West 1,428.42 feet, to a TxDOT Type II monument found for the end of said curve, being on the said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 77 degrees 44 minutes 27 seconds West, along the said proposed northwesterly right-of-way of U.S. Highway 190, passing at a distance of 493.10 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POL, in all a total distance of 986.20 feet to the **POINT OF BEGINNING** and containing 128.48 acres or 5,596,710 square feet of land. (Bearings are referenced to the Texas Coordinate System, Central Zone, North American Datum of 1983 and referenced to the National Geodetic Survey Monument TXBU BURNET CORS ARP PID DG5763).

PART 2

FIELD NOTES FOR 0.6490 ACRES OR 28,271 SQUARE FEET OF LAND BEING A PORTION OF A TRACT OF LAND DESCRIBED IN A DEED DATED APRIL 15, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 143, PAGE 571 D.R.C.C.T., LOCATED IN THE WM. P. HARDEMAN SURVEY, ABSTRACT 454, CORYELL COUNTY, TEXAS.

COMMENCING at a 3/8-inch iron rod with cap, marked M & ASSOC., found for the southeast corner of a called 12.87 acre tract as described in deed dated September 24, 2003 to City of Copperas Cove, recorded in File No. 167945 O.R.C.C.T.;

THENCE North 33 degrees 48 minutes 05 seconds East, along the east line of the called 12.87 acre tract, a distance of 66.60 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for the south corner and **POINT OF BEGINNING** of the herein described tract, being on the proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE North 33 degrees 48 minutes 05 seconds East, continuing along the east line of the called 12.87 acre tract, a distance of 888.02 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for north corner of the herein described tract, being on the proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 25 degrees 04 minutes 54 seconds West, along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 178.23 feet a TxDOT Type II monument found on the said proposed northwesterly right-of-way line of U.S. Highway 190, being the beginning of a curve to the right which center bears North 64 degrees 55 minutes 31 seconds West;

THENCE in a southwesterly direction, along the said proposed northwesterly right-of-way line of U.S. Highway 190 and with said curve to the right, having a radius of 1,890.00 feet, passing at an arc length of 350.19 feet a 5/8-inch iron rod with aluminum cap stamped "LCI" set for a POC, a total arc length of 700.39 feet, a central angle of 21 deg. 13 min. 57 sec., and a chord which bears South 35 deg. 41 min. 28 sec. West 696.39 feet to a TxDOT Type II monument found for the end of said curve, on the said proposed northwesterly right-of-way line of U.S. Highway 190, being the beginning of a compound curve to the right which center bears North 41 degrees 59 minutes 10 seconds West;

THENCE in a southwesterly direction, along the said proposed northwesterly right-of-way line of U.S. Highway 190 and with said curve to the right, having a radius of 3,245.00 feet, an arc length of 16.35 feet, a central angle of 00 deg. 17 min. 19 sec., and a chord which bears South 48 deg. 09 min. 29 sec. West 16.35 feet to the **POINT OF BEGINNING** and containing 0.6490 acres or 28,271 square feet of land. (Bearings are referenced to the Texas Coordinate System, Central Zone, North American Datum of 1983 and referenced to the National Geodetic Survey Monument TXBU BURNET CORS ARP PID DG5763).

PART 3

FIELD NOTES FOR 0.0216 ACRES OR 940 SQUARE FEET OF LAND BEING A PORTION OF A TRACT OF LAND DESCRIBED IN A DEED DATED APRIL 15, 1943 TO UNITED STATES OF AMERICA RECORDED IN VOLUME 143, PAGE 571 D.R.C.C.T., LOCATED IN THE WM. P. HARDEMAN SURVEY, ABSTRACT 454, CORYELL COUNTY, TEXAS.

COMMENCING at a 3/8-inch iron rod with cap, marked M & ASSOC., found for the northeast corner of a called 12.87 acre tract as described in deed dated September 24, 2003 to City of Copperas Cove, recorded in File No. 167945 O.R.C.C.T.;

THENCE South 20 degrees 16 minutes 45 seconds West, along the east line of the called 12.87 acre tract, a distance of 54.24 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for the north corner and **POINT OF BEGINNING** of the herein described tract, being on the proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 19 degrees 10 minutes 46 seconds East, along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 18.84 feet to a TxDOT Type II monument found for an east corner of the herein described tract, being on the said proposed northwesterly right-of-way line of U.S. Highway 190;

THENCE South 25 degrees 04 minutes 54 seconds West, continuing along the said proposed northwesterly right-of-way line of U.S. Highway 190, a distance of 143.00 feet to a 5/8-inch iron rod with aluminum cap stamped "LCI" set for the south corner of the herein described tract, being on the east line of the called 12.87 acre tract;

THENCE North 20 degrees 16 minutes 45 seconds East, along the east line of the called 12.87 acre tract, a distance of 157.05 feet to the **POINT OF BEGINNING** and containing 0.0216 acres or 940 square feet of land. (Bearings are referenced to the Texas Coordinate System, Central Zone, North American Datum of 1983 and referenced to the National Geodetic Survey Monument TXBU BURNET CORS ARP PID DG5763).

Total Acreage
Part 1=128.48
Part 2= 0.6490
Part 3=0.0216
Total=129.1506

Landtech Consultants, Inc.

Scott M. Fertak
Reg. Prof. Land Surveyor No. 5257

STATE OF TEXAS
REGISTERED
SCOTT M. FERTAK
5257
PROFESSIONAL
LAND SURVEYOR

Dwg. No. 1431-D-2575
Job No. 0720306

190990

Deed without Warranty

Date: September 20, 2005

Grantor: City of Copperas Cove, a municipal corporation

Grantor's Mailing Address:

City of Copperas Cove
507 So. Main St.
Copperas Cove, Texas 76522
Coryell County

Grantee: Copperas Cove Economic Development Corporation, a Texas corporation

Grantee's Mailing Address:

Copperas Cove Economic Development Corporation
210 So. First St.
Copperas Cove, Texas 76522
Coryell County

Consideration:

TEN AND NO/100 DOLLARS ($10.00) and other good and valuable consideration.

Property (including any improvements):

All that certain land in Coryell County, Texas consisting of three (3) tracts. Tract One (1) containing 12.87 acres and more fully described by metes and bounds in Exhibit "A"; Tract Two (2) containing 13.97 acres and more fully described by metes and bounds in Exhibit "B"; Tract Three (3) containing 87.21 acres and more fully described by metes and bounds in Exhibit "C", for a total of 114.05 acres.

Reservations from Conveyance:

None

Exceptions to Conveyance and Warranty:

None

Grantor, for the Consideration and subject to the Reservations from Conveyance and the Exceptions to Conveyance, grants, sells, and conveys to Grantee the Property, together with all and singular the rights and appurtenances thereto in any way belonging, to have and to hold it to Grantee and Grantee's heirs, successors, and assigns forever, without express or implied warranty. All warranties that might arise by common law as well as the warranties in section 5.023 of the Texas Property Code (or its successor) are excluded.

This conveyance is intended to include any property interests obtained by after-acquired title.

Affected Property Owners: Copperas Cove Economic Development Corporation, it's successors, heirs, transferees and assigns.

Restrictions: When Tracts 1 & 2 of this property become contiguous to the City of Copperas Cove, Texas, Copperas Cove Economic Development Corporation it's heirs successors or assigns shall take the necessary steps to have the property annexed into City and will dedicate appropriate rights-of way and easements for the City's infrastructure as the property is platted and developed.

Grantor, as the fee simple owner of the Property, establishes the Restrictions as covenants, conditions, and restrictions, whether mandatory, prohibitive, permissive, or administrative, to regulate the structural integrity, appearance, and uses of the Property and the improvements placed on it. Grantor and Grantee stipulate that (a) the Restrictions touch and concern the Property; (b) privity of estate exists by reason of the ownership of the Property; (c) notice is given by filing this instrument in the real property records of the county in which the Property is situated; and (d) the Restrictions are reasonable, their purposes being for the common benefit of Grantor, Grantee, and the Affected Property Owners, who are affected by the structural integrity, appearance, and uses of the Property. The Restrictions run with the land making up the Property, are binding on Grantee and Grantee's successors and assigns forever, and inure to the benefit of Grantor, Grantee, Affected Property Owners, and their successors and assigns forever.

As part of the consideration for this deed, Grantor and Grantee agree that, as between Grantor and Grantee, the risk of liability or expense for environmental problems, even if arising from events before closing, is the sole responsibility of Grantee, regardless of whether the environmental problems were known or unknown at closing. Grantee indemnifies, holds harmless, and releases Grantor from liability for any latent defects and from any liability for environmental problems affecting the property, including liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Texas Solid Waste Disposal Act, or the Texas Water Code. Grantee indemnifies, holds harmless, and releases Grantor from any liability for environmental problems affecting the property arising as the result of

Grantor's own negligence or the negligence of Grantor's representatives. Grantee indemnifies, holds harmless, and releases Grantor from any liability for environmental problems affecting the property arising as the result of theories of products liability and strict liability, or under new laws or changes to existing laws enacted after the effective date that would otherwise impose on Grantor in this type of transaction new liabilities for environmental problems affecting the property.

When the context requires, singular nouns and pronouns include the plural.

City of Copperas Cove, a municipal corporation,

Bradi D. Diaz

~~Braid D~~. Diaz, Mayor
Bradi

Attest:

Pamela J. Russell

Pamela J. Russell, City Secretary

STATE OF TEXAS)

COUNTY OF CORYELL)

On this day, before me, the undersigned Notary Public, personally appeared Bradi D. Diaz, acting for the City of Copperas Cove, Texas in her capacity as Mayor of the City of Copperas Cove, Texas, personally known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal on this 13th day of Jan., 2006.

Lisa Wilson

Notary Public, State of Texas
My commission expires: 9-29-09

LISA WILSON
Notary Public, State of Texas
My Commission Expires
September 29, 2009

FIELD NOTES for a tract of land in Coryell County, Texas part of the W. P. Hardeman Survey Abstract No. 454 and the land herein described being part of that called 165 acre tract described in a deed from Annie Fischgrabe and husband Charlie Fischgrabe to the United States of America and Its Assigns being of record in Volume 146, Page 410, deed records of Coryell County, Texas and being part of that called 116 acre tract of land described in a Judgement of Declaration of Taking No. 1 to the United States of America being of record in Volume 143, Page 571 deed records of Coryell County, Texas, and being part of that 127 acre tract of land described in a deed from Hans J. Leonhard and wife, Emma Leonhard to the United States of America and Its Assigns being of record in Volume 147, Page 220, Deed Records of Coryell County, Texas.

BEGINNING at a 5/8 inch iron rod with cap found in the south right-of-way of Old Copperas Cove Road (proposed) and the east right-of-way of US Hwy 190 (proposed), which bears S 36 deg 52 min 46 sec E., 1142.69 feet from a 3/8 inch iron rod found at the southeast corner of a called 92.780 acre tract of land described in a deed to the City of Copperas Cove, being of record in Volume 460, Page 742, Deed Records of Coryell County, Texas, for the most northerly northwest corner of this.

THENCE with the south right-of-way of Old Copperas Cove Road (proposed) S. 88 deg 33 min 04 sec E., 367.71 feet to a 3/8 iron rod with cap stamped "M&Assoc Killeen" set, for the northeast corner of this.

THENCE S. 20 deg 16 min 30 sec W., 441.18 feet to a 3/8 inch iron rod with cap stamped "M&Assoc Killeen" set and S 33 deg 49 min 02 sec W., 1081.76 acres to a 3/8 inch iron rod with cap stamped "M&Assoc Killeen" set, for the southeast corner of this.

THENCE N. 55 deg 17 min 58 sec W., 400.52 feet to a 3/8 inch iron rod with cap stamped "M&Assoc Killeen" set in a curve to the left in the east right-of way of US Hwy 190 (proposed) for the southwest corner of this.

THENCE with the east right-of-way of US Hwy 190 (proposed) and said curve to the left 62.06 (Long Chord bears N. 34 deg 15 min 21 sec E., 62.06 feet, having a radius of 3999.13 feet; right-of-way radius = 3999.72 feet) to a 5/8 inch iron rod with cap found for a corner of this.

THENCE continuing with the east right-of-way of US Hwy 190 (proposed) N. 33 deg 49 min 02 sec E., 966.04 feet (proposed right-of-way calls N. 33 deg 49 min 00 sec E., 966.00 feet) to a 5/8 inch iron rod with cap found N 20 deg 16 min 30 sec E., 208.06 feet (proposed right-of way calls N. 20 deg 14 min 20 sec E., 208.07 feet) to a 5/8 inch iron rod with cap found and N 58 deg 05 min 04 sec E, 84.76 feet (proposed right of way calls N. 58 deg 05 min 36 sec E., 84.74 feet) to the PLACE OF BEGINNING containing 12.87 acres of land.

The bearings for the above description are based on a portion of the west Right-of-way of US Hwy 190 (proposed).

STATE OF TEXAS

COUNTY OF BELL

KNOW ALL MEN BY THESE PRESENTS, that I Gary W. Mitchell, Registered Professional Land Surveyor, do hereby certify that I did caused to be surveyed on the ground.

IN WITNESS THEREOF, my hand and seal this the 18th day of November, 2002, A. D.

Gary W. Mitchell
Registered Professional
Land Surveyor, No. 4982

STATE OF TEXAS REGISTERED GARY W. MITCHELL 4982 PROFESSIONAL LAND SURVEYOR

FIELD NOTES for a tract of land in Coryell County, Texas, part of the W. P. Hardeman Survey, Abstract No. 409 and the C. G. Bennett Survey Abstract No. 1680, and the land herein described being part of that called 127 acre tract of land described in a deed from Hans J. Leonhard and wife Emma Leonhard to the United States of America and its assigns, being of record in Volume 147, Page 270, Deed Records of Coryell County, Texas.

BEGINNING at a 5/8" iron rod with cap found in the north right-of-way of Old Copperas Cove Road (proposed) and in the east right-of-way of U. S. Highway 190 (proposed) which bears S. 45° 48' 54" W., 1044.47 feet from a 3/8" iron rod found at the southeast corner of a called 92.780 acre tract of land described in deed to the City of Copperas Cove, being of record in Volume 460, Page 742, Deed Records of Coryell County, Texas, for the most southerly southwest corner of this.

THENCE with the east right-of-way U. S. Highway 190 (proposed) N. 30° 44' 31" W., 60.39 feet (right-of-way calls N. 30° 41' 59" W., 60.53 feet) to a 5/8" iron rod with cap found, for a corner of this.

THENCE continuing with the east right-of-way U. S. Highway 190 (proposed) N. 20° 14' 08" E., 623.02 feet (right-of-way calls N. 20° 14' 20" E., 622.83 feet) to a 5/8" iron rod with cap found and N. 20° 14' 37" E., 392.33 feet (right-of-way calls N. 20° 14' 20" W., 392.52 feet) to a 5/8" iron rod with cap found at the beginning of a curve to the right, for a corner of this.

THENCE continuing with the east right-of-way U. S. Highway 190 (proposed) and with said curve to the right 550.80 feet (Long Chord bears N. 30° 09' 11" E., 550.42 feet, having a radius of 4240.17 feet, right-of-way radius=4240.18) to a 3/8" iron rod with cap stamped "M & Assoc., Killeen" set, for the northwest corner of this.

THENCE S. 56° 07' 32" E., 411.85 feet to a 3/8" iron rod with cap stamped "M & Assoc., Killeen" set, for the northeast corner of this.

THENCE S. 34° 29' 14" W., 386.00 feet to a 3/8" iron rod with cap stamped "M & Assoc., Killeen" set and S. 20° 14' 37" W., 1044.82 feet to a 3/8" iron rod with cap stamped "m & Assoc., Killeen" set in the north right-of-way of Old Copperas Cove Road (proposed), for the southeast corner of this

THENCE with the north right-of-way of Old Copperas Cove Road (proposed) N. 82° 27' 30" W., 361.84 feet to the Point of Beginning, containing 13.97 acres of land of which 1.10 acres of land being in a Texas Public Utility Company easement, being of record in Volume 106, Page 284, Deed Records of Coryell County, Texas, for a net acreage of 12.87 Acres.

The bearings for the above description are based on a portion of the west Right-of-Way of U. S. Highway 190 (proposed)

****

STATE OF TEXAS

COUNTY OF BELL

KNOW ALL MEN BY THESE PRESENTS, that I, Gary W.. Mitchell, Registered Professional Land Surveyor, do hereby certify that I did cause to be surveyed on the ground the above described tract of land and to the best of my knowledge and belief, the said description is true and correct.

IN WITNESS THEREOF, my hand and seal this the 18th day of November 2002, A.D.

Gary W. Mitchell
Registered Professional
Land Surveyor, No. 4982

STATE OF TEXAS REGISTERED GARY W. MITCHELL 4982 PROFESSIONAL LAND SURVEYOR

EXHIBIT "B"

FIELD NOTES for a tract of land in Coryell County, Texas, part of the W.P. Hardeman Survey, Abstract No. 454, and the land herein described being part of a tract of land described in a Deed from Hans J. Leonhard and wife, Emma Leonhard to the United States of America and its assigns, being of record in Volume 147, Page 270, Deed Records of Coryell County, Texas, and being part of a tract of land described in a Deed from Annie Fischgrabe and husband Charlie Fischgrabe to the United States of America and its assigns, being of record in Volume 146, Page 410, Deed Records of Coryell County, Texas, and being part of a tract of land described in a Deed from Selma Leonhard to the Untied States of America and its assigns, being of record in Volume 146, Page 411, Deed Records of Coryell County, Texas.

BEGINNING at a 3/8-inch iron rod found in the West line of said United States of America tract, (Volume 146, Page 410), being the northeast corner of a called 376 acre tract described in a Deed to Curtis Manning and wife Joyce Manning, being of record in Volume 306, Page 361, Deed Records of Coryell County, Texas, and the southeast corner of Second Amended Thousand Oaks Addition II, an Addition to the City of Copperas Cove, Texas, being of record in Volume 6, Page 30, Plat Records of Coryell County.

THENCE, with the East line of said Second Amended Thousand Oaks Addition II, and with the West line of said United States of America tract, (Volume 146, Page 410), North 14° 48' 30" East, 1741.02 feet, (Deed calls North 19° 00' 00" East), to a 3/8-inch iron rod with cap stamped "M&ASSOC.,KILLEEN" set, being the northeast corner of said Second Amended Thousand Oaks Addition II, and the most easterly southeast corner of Thousand Oaks Addition I, an Addition to the City of Copperas Cove, Texas, being of record in Volume 4, Page 35, Plat Records of Coryell County, for a corner in the West line of this.

THENCE, with the East line of said Thousand Oaks Addition I, and theWest line of said United States of America tract, (Volume 146, Page 410), North 15° 19' 02" East, 300.14 feet to a flagged steel post found and North 15° 48' 36" East, 174.07 feet, (Deed calls North 19° 00' 00" East), to a 1-inch iron pipe found being the northeast corner of said Thousand Oaks Addition I, the southeast corner of Nauert Addition 8th Extension, an Addition to the City of Copperas Cove, Texas, being of record in Volume 4, Page 51, Plat Records of Coryell County, Texas, and the northwest corner of said United States of America tract, (Volume 146, Page 410), and the southwest corner of said United States of America tract, (Volume 147, Page 270), for a corner in the West line of this.

THENCE, with the East line of said Nauert Addition 8th Extension, and the West line of said United States of America tract, (Volume 147, Page 270), North 15° 58' 42" East, 698.52 feet to a 3/8-inch iron rod found in the East line of Nauert Addition 7th Extension, an Addition to the City of Copperas Cove, Texas, being of record in Volume 2, Page 34, Plat Records of Coryell County, Texas, being the southeast corner of a called 92.780-Acre tract of land described in a Deed to the City of Copperas Cove, Texas, being of record in Volume 460, Page 742, Deed Records of Coryell County, Texas.

THENCE, South 74° 02' 56" East, 1038.28 feet to a 3/8-inch iron rod found, being the southeast corner of said 92.780-Acre tract, for an ell corner of this.

THENCE, with the East line of said 92.780-Acre tract, North 33° 13' 10" East, 825.69 feet, (adjoiner calls North 33° 19' 38" East, 825.28 feet), to a 3/8-inch iron rod found at the beginning of a curve to the right, for a corner of this.

THENCE, continuing with the East line of said 92.780-Acre tract, and said curve to the right, 303.47 feet, (long chord bears North 37° 47' 25" East, 303.15 feet, having a radius of 1905.90 feet, adjoining arc calls 303.68 feet), to a 3/8-inch iron rod found, for a corner of this.

THENCE, continuing with the East line of said 92.780-Acre tract, North 42° 20' 34" East, 772.15 feet, (adjoiner calls North 42° 20' 15" East), to a 5/8-inch iron rod with cap found at the beginning of a curve to the left in the East line of Copperas Cove 190 Business and Industrial Park, Phase Two, being of record in Cabinet A, Slide 369, Plat Records of Coryell County, Texas, and in the West Right of Way of U.S. Highway 190, (proposed), for the most northerly corner of this.

THENCE, with the West Right of Way of U.S Highway 190, (proposed), and with said curve to the left, 1598.49 feet, (long chord bears South 29° 16' 17" West, 1591.88 feet, having a radius of 5069.65 feet, proposed arc being 1598.28 feet), to a 5/8-inch iron rod with cap found for a corner of this.

THENCE, continuing with the West Right of Way of US Highway 190, (proposed), South 20° 14' 03" West, 782.83 feet, (proposed Right of Way calls South 20° 14' 20" West, 782.99 feet), to a mag nail found at a cutback in said proposed Right of Way, for a corner of this.

THENCE, continuing with the West Right of Way of said proposed U S Highway 190, and with said cutback, South 57° 44' 38" West, 83.86 feet, (proposed Right of Way calls South 57° 44' 38" West, 83.76 feet), to a 5/8-inch iron rod with cap found, South 20° 31' 21" West, 107.08 [illegible]

THENCE, continuing with the proposed West Right of Way of U S Highway 190 and said curve to the right, 2102.32 feet, (long chord bears South 51° 15' 36" West, 2073.21 feet, having a radius of 3639.72 feet, arc calls 2102.14 feet), to a 5/8-inch iron rod found in the East line of said 376-Acre tract and the West line of said United States of America tract, (Volume 146, Page 410), for the southwest corner of this.

THENCE, with the East line of said 376-Acre tract, and the West line of said United States of America tract, (Volume 146, Page 410), North 17° 33' 57" East, 602.49 feet, (Deed calls North 19° 00' 00" East), to the PLACE OF BEGINNING, CONTAINING 87.21-Acres of land, of which 3.64-Acres are in a Texas Public Utilities Easement being of record in Volume 106, Page 284, Deed Records of Coryell County, Texas, for a Net Acreage of 83.57-Acres.

The bearings for the above described tract of land are based upon a portion of the West Right-of-Way of proposed U.S. Highway 190 By-Pass.

****

STATE OF TEXAS
COUNTY OF BELL

KNOW ALL MEN BY THESE PRESENTS, that I, Gary W. Mitchell, Registered Professional Land Surveyor, do hereby certify that I did cause to be surveyed on the ground the above described tract of land.

IN WITNESS THEREOF, my hand and seal this the 18th day of November, 2002, A. D.

Gary W. Mitchell
Registered Professional
Land Surveyor, No. 4982

STATE OF TEXAS REGISTERED GARY W. MITCHELL 4982 PROFESSIONAL LAND SURVEYOR

STATE OF TEXAS
COUNTY OF CORYELL

I, Barbara Simpson, County Clerk in and for Coryell County, Texas do hereby certify that this instrument was filed for record in the volume and page of the Coryell County Public Records and at the time and date as stamped hereon by me.

BARBARA SIMPSON, CLERK
CORYELL COUNTY, TEXAS

Barbara Simpson

Filed For Record
AT 9:45 O'CLOCK A M

JAN 19 2006

Barbara Simpson
County Clerk, Coryell Co., Texas

190990

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- Commission
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Send a resume to joyce@coveleaderpress.com
Mail one to Joyce Hauk, Copperas Cove Leader-Press, P.O. Box 370, Copperas Cove, TX 76522
Or bring one by to 2210 E. Hwy. 190, Suite 1

PUBLIC NOTICE

PUBLIC NOTICE

PUBLIC NOTICE

Copperas Cove

SOLID WASTE TRANSFER STATION CONCRETE FLOOR TOPPING BID NO. 2010 – 10 - 92
Advertisement and Invitation for Bids

The City of Copperas Cove will receive bids for Solid Waste Transfer Station Concrete Floor Topping Project which will require preparing the existing transfer station floor surface and place and cure the high strength concrete floor topping and all work related to the application of the topping. Bids will be due until 2:00 p.m. August 25, 2010 at City Hall, 507 S. Main Street, Copperas Cove, TX 76522, in the City Council Chambers. At that time, the bids will be publicly opened and read aloud.

Further information may be obtained from the Purchasing Officer, at the referenced address or by calling 254.547.4221. All BIDS submitted must be plainly marked on the outside indicating the BID number, opening time and date. The City of Copperas Cove reserves the right to reject any or all BIDS.

Further information may be obtained from the Purchasing Officer, at the referenced address or by calling 254.547.4221. All RFPS submitted must be plainly marked on the outside indicating the RFP number, opening time and date. The City of Copperas Cove reserves the right to reject any or all RFPS.

Tracy Molnes, Purchasing Officer

Copperas Cove

PUBLIC NOTICE

Notice is hereby given that a **public hearing will be held in the City Council Chambers of City Hall**, City of Copperas Cove, 507 South Main Street. The public hearing will be held by the City Council on **August 17, 2010 at 7:00 p.m.** The purpose of the hearing is to allow the citizens of Copperas Cove an opportunity to be heard in connection with Council consideration of annexation of land further described as follows:

A public hearing on a request to annex 6.8 acres out of the Ed S. Jones Survey, Abstract #574, Coryell County, Texas, being undeveloped land owned by the City of Copperas Cove, Texas, on the northwest side of the intersection of Grimes Crossing Road and FM 1113 to the City of Copperas Cove, Texas.

All interested citizens and property owners are hereby notified of their rights to appear and be heard on this matter.

Copperas Cove

PUBLIC NOTICE

Notice is hereby given that a **public hearing will be held in the City Council Chambers of City Hall**, City of Copperas Cove, 507 South Main Street. The public hearing will be held by the City Council on **August 17, 2010 at 7:00 p.m.** The purpose of the hearing is to allow the citizens of Copperas Cove an opportunity to be heard in connection with Council consideration of annexation of land further described as follows:

A public hearing on a request to annex 155.8906 acres out of the D.D. Thompson Survey (Abstract 1041), A.G. Mathews Survey (Abstract 1765), James A. Wells Survey (Abstract 1065), C.G. Bennett Survey (Abstract 1680), Wm. P. Hardeman Survey (Abstract 454) and Richard Hallmark Survey (Abstract 466) Coryell County, Texas, being undeveloped land owned by the Copperas Cove Economic Development Corporation and being generally located east of Constitution Drive and south of US Highway 190 to the City of Copperas Cove, Texas.

All interested citizens and property owners are hereby notified of their rights to appear and be heard on this matter.

CLASSIFIED DEADLINES

FOR TUES.: By Friday 5 p.m.
FOR FRI.: By Wed. 5 p.m.

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. I-1

Contact – Polo Enriquez, CCEDC Executive Director, 547-7874
polo.enriquez@copperascove-edc.com

SUBJECT: **Consideration and action on approval of the Copperas Cove Economic Development Corporation FY2010-2011 Budget.**

---

1. BACKGROUND/HISTORY

Attached is the CCEDC's FY 2010-2011 Budget. The Budget is submitted to the City Council for approval per the provisions of Section 21 of the Development Corporation Act.

2. FINDINGS/CURRENT ACTIVITY

The proposed budget was presented to the CCEDC Board on July 22, 2010. The CCEDC Board approved the FY 2010-2011 Proposed Budget as presented.

3. FINANCIAL IMPACT

None.

4. ACTION OPTIONS/RECOMMENDATION

CCEDC Board of Directors recommends approval of the CCEDC Budget for FY2010-2011.

Copperas Cove Economic Development Corporation
Approved Budget
Fiscal Year 2009-2010

	CCEDC Approved Budget 2010-2011
Fund Balance	
Capital Project Funds	$ 8,600.00
Operating Fund	$ 2,606,224.00
Debt Service Fund (Reserve)	$ 8,556.00
Beginning Fund Balance	**$ 2,623,380.00**
Income	
Income	
Sales Tax	$ 975,000.00
Interest Earnings	$ 10,000.00
Digital Sign	$ 24,000.00
Total Income	$ 1,009,000.00
Beginning Fund Balance and Total Income	**$ 3,632,380.00**
Business Retention Program Services	
Consultant/Contract	$ 20,000.00
Advertising	$ 7,500.00
Ft. Hood Government Exposition	$ 500.00
Total Business Retention	$ 28,000.00
General Administration	
Audit/Financial Services	$ 7,000.00
Community Relations	$ 13,500.00
Technology Equipment	
Equipment (was Hardware)	$ 1,000.00
Internet/Website	$ 2,800.00
Maintenance	$ 7,500.00
Software	$ 1,500.00
Consultants	$ 5,000.00
Copier Lease	$ 4,000.00
Subscriptions/Publications	$ 7,500.00
Office Equipment	$ 1,000.00
Furniture	$ 3,000.00
Insurance	$ 10,000.00
Legal	$ 12,000.00
Memberships/Dues	$ 4,500.00
Office Supplies	$ 6,500.00
Postage & Shipping	$ 3,000.00
Seminar/Training/Professional Development	$ 8,000.00

Copperas Cove Economic Development Corporation
Approved Budget
Fiscal Year 2009-2010

		Telephone		$	8,500.00
		Travel		$	7,500.00
	Total General Administration			$	113,800.00
	Digital Sign				
		Design Services		$	2,000.00
		Electric		$	6,000.00
		Maintenance		$	3,000.00
		Operating Equipment		$	2,000.00
	Total Digital Sign			$	13,000.00
	Building Services				
		Bldg. Improvements (Capital)		$	2,500.00
		Building Maintenance/Supplies		$	15,000.00
		Janitorial		$	8,000.00
		Utilities		$	15,000.00
	Total Building Services			$	40,500.00
	Debt Service				
		First National Bank- Spec. Bldg.		$	90,000.00
	Total Debt Service			$	90,000.00
	Personnel				
		Accrued Benefits/Educ. Assist.		$	1,500.00
		Relocation of Exec. Director		$	11,600.00
		Executive Director		$	90,000.00
		Marketing Director		$	45,300.00
		Office Manager		$	37,300.00
		Medical Plan/Emp. Insurance		$	20,000.00
		Unemployment Taxes		$	600.00
		Payroll Expenses		$	16,000.00
		Pension Plan		$	20,000.00
	Total Personnel			$	242,300.00
	Business Attraction				
		Branding			
			Go West Campaign	$	7,000.00
			HOTDA Allowance	$	50,000.00
			Prospect Generation Services	$	8,500.00
			Joint Image Campaign	$	8,000.00
			Regional Ad Campaign - FHER	$	12,000.00
			Texas One	$	1,000.00
			Team Texas	$	3,000.00
		Total Branding		$	89,500.00

Copperas Cove Economic Development Corporation
Approved Budget
Fiscal Year 2009-2010

Advertising and Marketing	$	30,000.00
Consultants	$	40,000.00
Demographics and Studies	$	5,000.00
Travel	$	30,000.00
Total Business Attraction	$	194,500.00
Total Operating Expense	**$**	**722,100.00**
Capital Projects		
Architectural & Engineering	$	120,000.00
Incentives & Infrastructure Dev	$	500,000.00
Industrial Park Infrastructure	$	300,000.00
Extention of Constitution	$	1,300,000.00
Fence on Land Swap Property	$	80,000.00
Stoney Brook Infrastructure Reimbursement	$	224,000.00
Land Appraisal & Survey	$	25,000.00
Legal	$	40,000.00
Other/Contingency	$	50,000.00
Total Capital Projects	$	2,639,000.00
Net Income	**$**	**(2,352,100.00)**
Fund Balance		
Capital Project Funds	$	(2,630,400.00)
Operating Fund	$	2,887,124.00
Debt Service Fund (Reserve)	$	14,556.00
Ending Fund Balance	**$**	**271,280.00**

Passed and approved on the 22nd day of July, 2010.

Dan Yancey, Chairman

Jimmy Clark, Vice-Chairman

Ray Don Clayton, Secretary

Fred Chavez, Treasurer

Tom Boren, Director

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. I-2

Contact – Andrea M. Gardner, City Manager, 547-4221
agardner@ci.copperas-cove.tx.us

SUBJECT: **Consideration and action on evaluating the services of Municipal Court Judge.**

---

1. BACKGROUND/HISTORY

The City of Copperas Cove appointed F.W. Price as the Municipal Court Judge on December 15, 1992.

2. FINDINGS/CURRENT ACTIVITY

Texas Government Code Section 29.005 (Term of Office) states "The judge of a municipal court serves for a term of office of two years unless the municipality provides for a longer term pursuant to Article XI, Section 11, of the Texas Constitution. A municipal court judge who is not reappointed by the 91st day following the expiration of a term of office shall, absent action by the appointing authority, continue to serve for another term of office beginning on the date the previous term of office expired."

City Charter Section 5.03 requires the Mayor and City Council to evaluate the municipal judge annually. As such, an evaluation form is attached if desired for use by the governing body.

3. FINANCIAL IMPACT

Municipal Court fiscal year proposed budget 2010-11 includes funding for independent contractor services of the Judge in the amount of $33,700 should the governing body decide to reappoint F.W. Price as the Municipal Court Judge by the 91st day following the expiration of a term of office.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends that the governing body evaluate the Municipal Court Judge as required by Section 5.03 of the City Charter.

City of Copperas Cove

Evaluation of Independent Contractor

The City of Copperas Cove Charter, Sec. 5.03 states the City Council and the Mayor shall evaluate the Municipal Judge annually, and each Council Member and the Mayor shall sign the evaluation.

Name and Title: F.W. Price, Judge of the Municipal Court – Independent Contractor Position

Functional areas:

A. Serve as the Municipal Court Judge for the City with all the powers, duties, privileges and obligations which said office confers.

B. Schedules and conducts arraignment sessions, pre-trial sessions, docket calls and jury and non-jury trials for the Copperas Cove Municipal Court.

C. Insofar as he may be reasonably available, shall conduct Magistrate proceedings at the Copperas Cove Police Department Jail, issue appropriate writs and warrants, and perform such other judicial and administrative duties that are normally performed by Texas Municipal Court Judges.

D. Provide the Mayor and the City Manager 48 hours notice when scheduled to be out of the City and unavailable to perform the magistrate functions described above.

Comments for evaluation:

Mayor	Council member/Mayor Pro Tem
Council member	Council member
Council member	Council member
Council member	Council member
F.W. Price, Contractor	Date
Acknowledgement of City Secretary for Filing	Date

City of Copperas Cove
City Council Agenda Item Report
August 17, 2010

Agenda Item No. I-3

Contact – Andrea M. Gardner, City Manager, 547-4221
agardner@ci.copperas-cove.tx.us

SUBJECT: **Consideration and action on evaluating the services of City Attorney and Municipal Court Prosecutor.**

---

1. BACKGROUND/HISTORY

The City of Copperas Cove appointed Denton, Navarro, Rocha & Bernal, P.C. on October 21, 2008 to perform the services of City Attorney and Municipal Court Prosecutor for the City.

2. FINDINGS/CURRENT ACTIVITY

City Charter Section 5.01 requires the Mayor and City Council to evaluate the City Attorney and Municipal Court Prosecutor annually. As such, an evaluation form is attached if desired for use by the governing body.

3. FINANCIAL IMPACT

None.

4. ACTION OPTIONS/RECOMMENDATION

City staff recommends that the governing body evaluate the City Attorney and Municipal Court Prosecutor as required by Section 5.01 of the City Charter.

City of Copperas Cove

Evaluation of Independent Contractor

The City of Copperas Cove Charter, Sec. 5.01 states the City Council and the Mayor shall evaluate the City Attorney annually, and each Council Member and the Mayor shall sign the evaluation.

Name and Title: Denton, Navarro, Rocha & Bernal, P.C., City Attorney and Municipal Court Prosecutor

Functional areas as outlined by the Copperas Cove City Charter Section 5.01:

A. Appear, in any court, on behalf of the City.

B. Represent the City in all litigation.

C. Serve as the legal advisor, counsel for the City and counsel for the departments of the City.

D. Review any and all ordinances considered suspect for change or deletion and cause said ordinance to be brought before the City Council with his/her recommendations.

Comments for evaluation:

Mayor	Council member/Mayor Pro Tem
Council member	Council member
Council member	Council member
Council member	Council member
Charles E. Zech Denton, Navarro, Rocha & Bernal, P.C.	Date
Acknowledgement of City Secretary for Filing	Date