337 - C - 6
Stuart St.
Homes at Meadow Woods
~~North Star~~
~~Enterprise~~

AH. 14

Charles B. Houghton
45 Stuart St.
Portland, ME 04103
Ph 878-3850

Aug. 3, 2000

Ms. Kandice Talbot, Planner
Portland City Hall
Portland, ME 04101

Re: MEADOW WOODS off Stuart St.

Dear Ms. Talbot:

As an abutter to the above 14 unit Condo proposed development, I am strongly opposed to it in its present format for the following reasons.

1. The 3.45 acre lot is heavily wooded and it appears as though most of the trees will have to be removed. Many of the larger trees are around the perimeter of the lot and form a beautiful backdrop for the backyards of over a dozen homes. Furthermore the taller trees enhance the skyline for many homes that do not abut the lot.. Replacing these trees with a 6' stockade fence would be a landscaping disaster that would ruin property values for the abutting homes. Leaving a 10 to 20 ft. buffer zone of existing trees would enhance the visual surroundings for those of us now living here as well as the future Condo residents. This buffer zone would also absorb rain runoff and reduce the need for swales and other drainage solutions planned by the developer.

2. I do not feel that any construction should take place until Stuart St. is accepted by the city. Why should the current Street owner benefit from payments for sewer line hookups? The owner of the street is dragging his feet in bringing the street up to code. I have lived here for over four years and the delay predates my move.

3. If the project does proceed, there should be evergreen plantings along the access road of Stuart St. I admit that this particularly concerns me since I also abut the access road.

4. Hillcrest West, another Condo is also off Stuart St. This development is well sited and does not create a visual disaster for surrounding properties. There is natural heavy vegetation, including trees surrounding at least two sides of the development.

5. I agree that people have the right to develop their property, but it should be in harmony with the surroundings and in this case it is mostly single family, owner occupied homes.

6. Recent photos are enclosed showing current back yard views.

Respectfully submitted,

Charles B. Houghton

Chas B. Houghton

14b

John & Carol Dudley
51 Stuart Street
Portland, Maine 04103
Telephone: 878-1385

August 9,2000

Ms. Kandice Talbot, Planner
Portland City Hall
389 Congress Street
Portland, Maine 04101

RE: Proposed 14-Unit Condo Development off Stuart Street
To Be Known As "Homes at Meadow Woods"

Dear Ms. Talbot:

We, as abutters to the above proposed development, are strongly opposed to the proposal as presented. We feel the adverse effects of the development on existing homes would be devastating.

We bought our home from William Train in December of 1999. We had been in our house only two weeks when surveyors were at work at the back of our property in anticipation of this development. We were shocked and dismayed. One of the reasons we were attracted to this home was the privacy afforded us in the back yard. If this proposal goes through as presented, instead of looking out our back windows and from our deck at beautiful trees and wildlife, we will see a 6-foot stockade fence!

We have read our next door neighbor's (Charles Houghton) letter to you of August 3rd and concur with all six points. Also, abutters McNeil-Davis and Crocket support our position and will attend the next workshop and hearing.

The major change we all want the developer to make is the addition of a 15- to 20-foot buffer zone of existing trees which would benefit not only existing homeowners but the future condo residents, as well. Good neighbors don't put up spite fences. We hope this critical point can be conveyed to the developer and changes can be made.

Enclosed, please find photos of our home and backyard. The stockade fence would come near the edge of our property (see clothesline in one of the photos).

Respectfully submitted,

John & Carol Dudley

Enclosures

14c

14d

Glen & Francine H. Hemingway
21 Harmony Road
Portland, ME 04103-1509
Tel. 207-838-6079

To: All Planning Board Members
City of Portland

From: Glen & Francine Hemingway

Cc: See below

Re: 114 Subdivision off Stuart Street
"Conrad Clark"

Date: August 14, 2000

This notice of concern is being hand delivered to the Portland Planning Office in individual envelopes to be distributed to each board member.

Please be advised that my property located at the end of Harmony Road has sustained damage with each approval that was extended to Developers without taking into consideration the drainage problems that already existed on and around my property.

The First Stage:

The land clearing on Stuart and Milton Street area. This area was a flood zone consequently it required extensive compacting of rock to ensure draining in the area and of course dry enough to build. The continual pounding caused stress on my property which resulted with cracks in my walls, wood beams and ultimately resulted or at least assisted in the failure of our sewer system. I'm sure it was a coincidence that the City had conveniently requested that Jim Wolfe place an outlet at the end of our land for us to hook into. So thanks to stage one and evacuation notice from The City we had to hire a contractor to hook on to City Sewer.

The Second Stage:

The houses being built behind me (Stuart Street) were elevated. The removal of the trees and the ground elevation caused my "entire" back and side yard to be under water. My lawn was literally washing down to the end of my property line. Numerous City Officials were involved in this matter and documentation can be found in the Planning files (Melody Estabrook was in place at this time). This problem took 6 months to resolve to some degree between Wolfe and the City. Wolfe agreed to drop 3 truck loads of dirt to help elevate our property. I had to hire a contractor again to spread the dirt and re-seed the area. My property still has water 9 months out of the year in a 30 foot radius of my back yard and the side that is adjacent to Mr. Charles Rodway.

PROPOSED THIRD STAGE:

I have seen the plan for a 14 unit condo subdivision off Stuart Street which extends into the back yards of Harmony Road. This street can not handle the present run off. This can be found through your Public Works Division. Numerous trucks getting stuck in the mud, grating of the road due to large pot holes etc. Harmony Road is the drainage road for the center of Newton Street. I have had to install three culverts to date because the water that comes down from the top of the street is massive during certain times of the year. Even my large street culvert (expense to me) that was installed a few years ago is lifting again because of the water that runs down from the undeveloped lots and road. This can be seen with the stream that flows through my cellar.

The required tree cutting and proposed water retention pond at the end of my property will place my back yard under water and the water being pumped from the site to Harmony Road will be devastating for my yard, driveway and cellar. This will ultimately decrease the value of my home, add to any health hazard presently in place from pounding water from Charles Rodway's property and make living in my own home unbearable.

The situations listed above can be easily confirmed through City Records and doing a physical inspection of Harmony Road. I would also recommend that you receive a copy of any Contractor that may have been hired by the City that may have evaluated this subdivision.

It is imperative that the City of Portland Planning Board Members review carefully and inspect all aspects to ensure that this proposed development meets the letter of the Law. The size of the complex will definitely impact my drainage problem and with the elimination of the trees and brush on 3.2 acres it will impact the houses on Stuart that are adjacent to my back yard and Mr. Rodway on Harmony Road. The 25 five foot buffer is a minimal requirement and to maximize this land at the cost of negatively impacting all present residents should be seriously reconsidered. A 35 foot buffer "with the original vegetation" in place plus tree plantings "large ones" in the 35 foot area would offer the same appearance that can presently be found with the Condos presently off Stuart Street that are welcomed by everyone in this community.

Your assistance and prompt attention to this urgent matter would be greatly appreciated I would appreciate a status report from the Planning Board as this review process goes forward.

Cc: Joseph E. Gray, Jr. Director
Alex Jaegerman, Chief
Jamey Caron
Deborah Krichels
Syrus Hagge
Kenneth Cole III
Mark Malone
Erin Rodriguez
Orlando Delogu
Kandi Talbot
Jay Hibbard, Councilman

149

Charles B. Houghton
45 Stuart St.
Portland ME 04103
PH 878-3850

Aug.21, 2000

Ms. Kandice Talbot, Planner
Portland City Hall
Portland ME 04101

Re: Proposed MEADOW WOODS Development

Dear Ms. Talbot:

Supplementing my letter of 8/3/00, I respectfully submit the following:

1. A petition signed by 22 neighbors who will be affected by the proposed Meadow Woods development; and additional photos that are self explanatory.

2. John Dudley, my neighbor and I circulated the petition. All of us are greatly concerned over the "tightness" of the proposed development that will require cutting hundreds of trees. There appear to be no provisions for a buffer zone. Several residents located at the lower elevations are even more upset over drainage problems since they already have water problems after heavy rains.

3. The name Meadow Woods is ironic. If the development proceeds as currently planned, the woods will be gone and the meadow will be mostly paved.

Sincerely.

Charles B. Houghton

CC - Jay Hibbard

14h

PETITION TO PORTLAND PLANING COMMISSION
RE: PROPOSED MEADOW WOODS CONDO DEVELOPMENT

We, the undersigned, oppose the above development in its current format for the following reasons:

1. The proposed layout would require the clear cutting of a heavily wooded 3.45 acre plot. which will lower current property values.
2. A green wall of Maple, Oak, and Poplar trees and wild shrubs at the rear of many currently developed lots would be replaced with a bleak stockade fence surrounding rather ugly buildings.
3. Although the developer promises to plant new trees and shrubs, it will take 20 to 30 years before they mature.
4. The project will greatly change the ecology of the neighborhood and destroy the habitat of hundreds of songbirds and other wildlife.
5. One possible compromise would be to leave a 15 to 20 foot greenbelt of the existing vegetation around selected segments of the perimeter.

Respectfully submitted:

DATE	PRINTED NAME	ADDRESS	SIGNATURE
8/11/00	JOHN DUDLEY	51 STUART ST.	John L Dudley
8/11/00	CAROL DUDLEY	51 STUART ST.	Carol D. Dudley
8/11/00	SCOTT DAVIS	61 Stuart St	Scott Davis
8/11/00	Jane McNeil-Davis	61 Stuart St	Jane McNeil-Davis
8-11-00	Catherine Crockett	71 Stuart St.	Catherine Crockett
8-11-00	JAY LYONS	79 Stuart St.	Jay Lyons
8-11-00	Marytracey Lyons	79 Stuart St.	Marytracey Lyons
8-12-00	Steven McKay	95 Stuart ST	Steven McKay
8-12-00	KIM DONOVAN	82 Stuart St	Kim Donovan
8-12-00	LEONARD HELMICK	74 STUART ST.	Leonard J Helmick
8-12-00	Thomas Crockett	71 Stuart st	Thomas Crockett
8-12-00	Peter Adams	66 Stuart	Peter Adams
8-12-00	Robert Simpson	85 Stuart	Rob Simpson
8-12-00	GAIL WALKER	85 Stuart	Gail Walker

14i

PETITION TO PORTLAND PLANING COMMISSION
RE: PROPOSED MEADOW WOODS CONDO DEVELOPMENT

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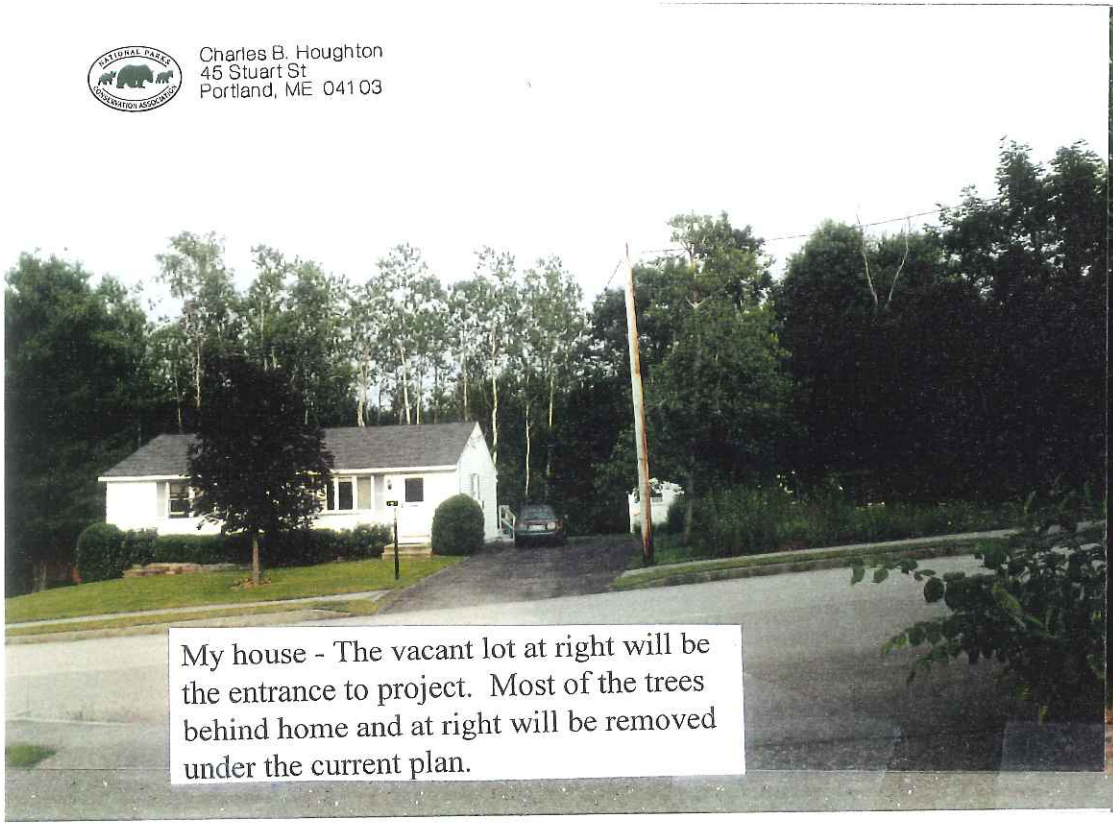
3. Although the developer promises to plant new trees and shrubs, it will take 20 to 30 years before they mature.
4. The project will greatly change the ecology of the neighborhood and destroy the habitat of hundreds of songbirds and other wildlife.
5. One possible compromise would be to leave a 15 to 20 foot greenbelt of the existing vegetation around selected segments of the perimeter.

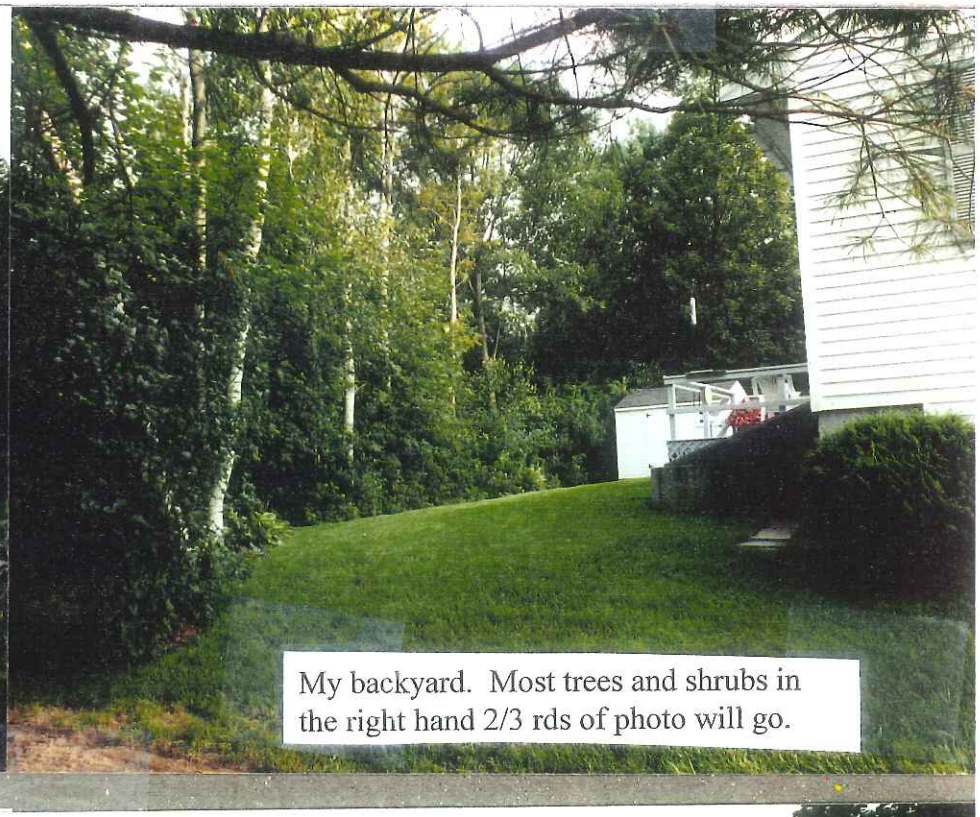
Respectfully submitted:

DATE	PRINTED NAME	ADDRESS	SIGNATURE
8/11/00	Charles B. Houghton	45 Stuart ST	Charles B. Houghton
8-12-00	Helene M. Albert	11 Stuart St	Helene M. Albert
8-12-00	Glen Hemingway	21 Harmony Rd.	Glen Hemingway
8-12-00	FRANCINE HEMINGWAY	21 HARMONY Rd	
8/12/00	Albert Cecrne	36 Newton St	albert Cecrne
8/13/20	JAMES Higgins	28 Stuart St.	
8/19/2000	LINDA EARLS	46 Newton	Linda Earls
8/19/2000	ROBERT EARLS	46 Newton	Robert Earls

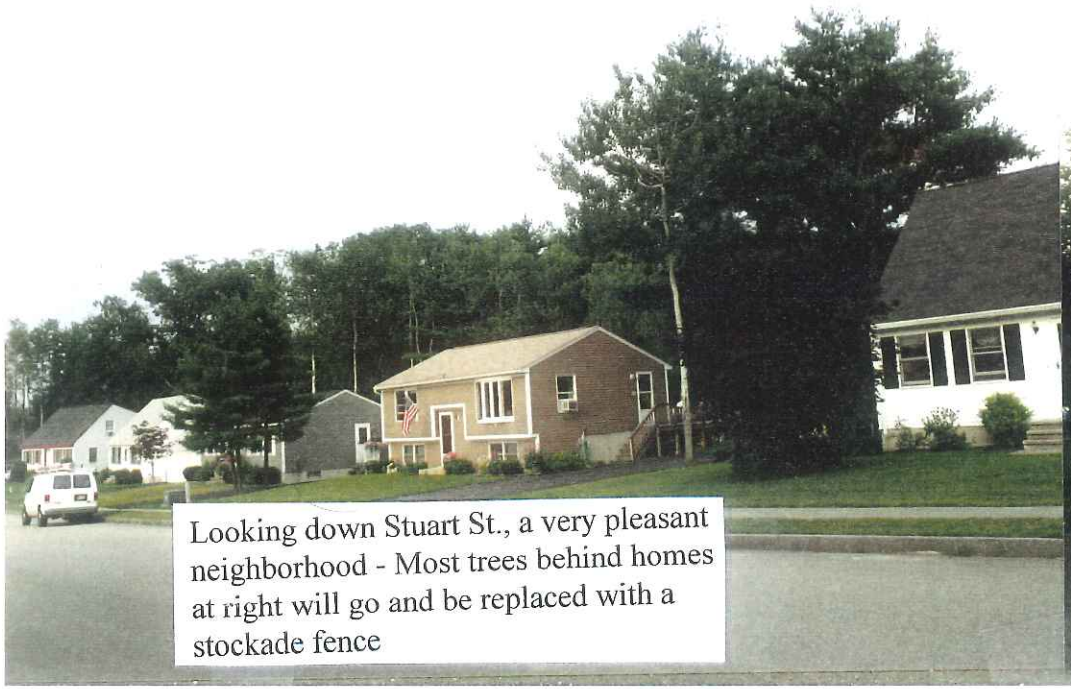
Charles B. Houghton
45 Stuart St
Portland, ME 04103



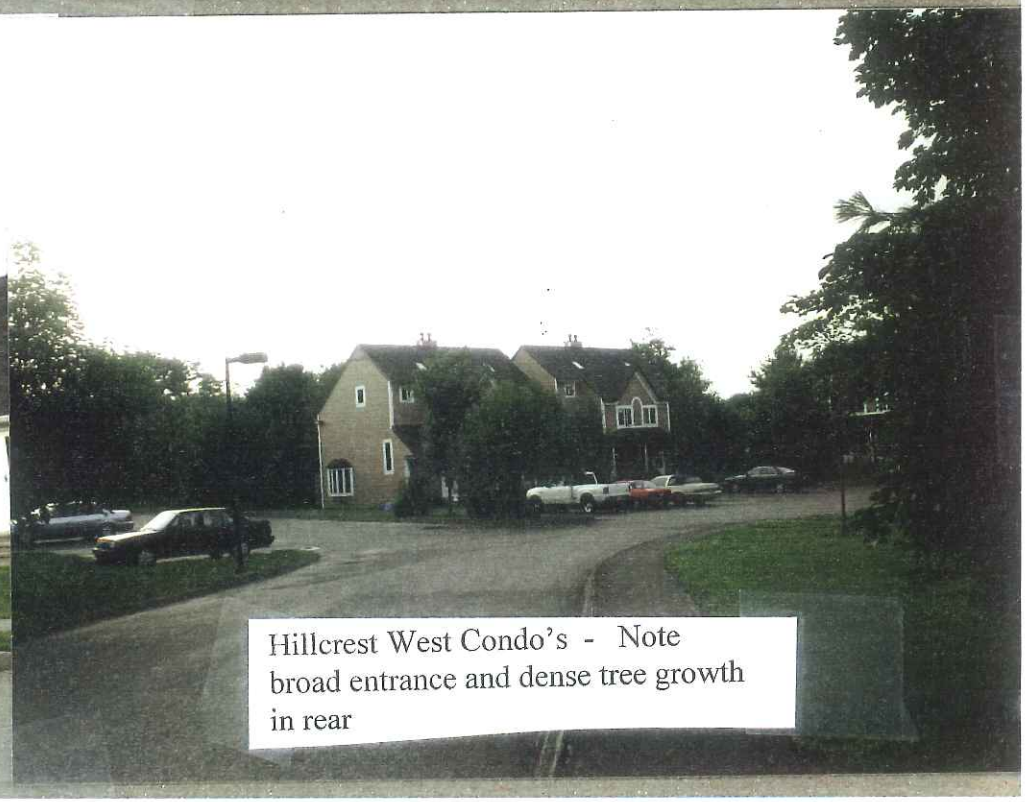
My house - The vacant lot at right will be the entrance to project. Most of the trees behind home and at right will be removed under the current plan.



My backyard. Most trees and shrubs in the right hand 2/3 rds of photo will go.



Looking down Stuart St., a very pleasant neighborhood - Most trees behind homes at right will go and be replaced with a stockade fence



Hillcrest West Condo's - Note broad entrance and dense tree growth in rear

Sebago Technics

Engineering & Planning for the Future

December 12, 2000
99172

Planning Board
City of Portland
389 Congress Street
Portland, Maine 04101

Revised Final Plan Submission of Homes at Meadow Woods

Dear Members of the Board:

On behalf of North Star Enterprises Inc., I am pleased to resubmit this Final Subdivision Plan for Homes at Meadow Woods, a 14-unit condominium project. Since our final submission, we have received review comments from the planning staff. This submission discusses those comments made in the Planning Board Report #65-00, dated December 12, 2000.

Under Section IV, Subdivision Review

5. Traffic: The detail shown on Sheet 9 has been revised to show the 24 foot width previously revised on all other sheets. The sign details and locations have been added to the plans. The entrance sign is going to be granite similar to the photograph attached to this letter. The sidewalk previously added to the inner side of the loop road has been relocated to the outer edge of the loop road. The outer edge already had curbing and catch basins, so the relocated sidewalk was placed adjacent to the curbing.

6. Sanitary/Stormwater: The pump station location is shown on Sheet 5, and the control panel and sizing information is shown on Detail Sheet 9.

- Right, Title, and Interest: The rights to Harmony Road became an issue late last week. The City never officially accepted Harmony Road, formerly known as Milton on the 1916 Woodfords Gardens Subdivision. To gain rights to Harmony Road, the developer has a purchase option on the Charles Rodway property. This is the property that we previously had a purchase option on and easement to cross it. The City Council stated that this will provide us with rights to Harmony to connect our storm water system to the catch basin at the corner of Lynn and Milton. These changes have been made to the attached plan set.

10. Financial Capability: The applicant has received the attached letter of financial capability from Peoples Bank, dated December 11, 2000.

13. Condominium Documents: These documents are currently being reviewed by the Corporation Council.

Under Section VI, Site Plan Review

3. Proposed Buildings: The catalogue cuts of the retaining wall are attached.

5. Landscaping/Existing Vegetation: The vegetative buffer proposed along the perimeter of the site will be reviewed by the City Arborist prior to construction. This will allow the review of existing vegetation, and the proposed location and quantity of new plantings. The Arborist will also review the buffer area after construction to see if any areas need to be replanted due to construction damage.

7. Exterior Lighting: The lighting cut sheets have been added to this submission. The locations have not changed and the lighting schematic has not changed.

8. Fire: The Fire Department has been provided with a proposed street name, "Leisure Lane".

10. Planned Residential Unit Development Review:

Section C. Recreation and Open Space:

3. Active Recreational Open Space: The recreational open space has been delineated on the site plan.

These are the limits of the changes that have been made. We look forward to meeting with you this evening to discuss these modifications. Thank you for your consideration.

Sincerely,

SEBAGO TECHNICS, INC.

Matthew W. Ek

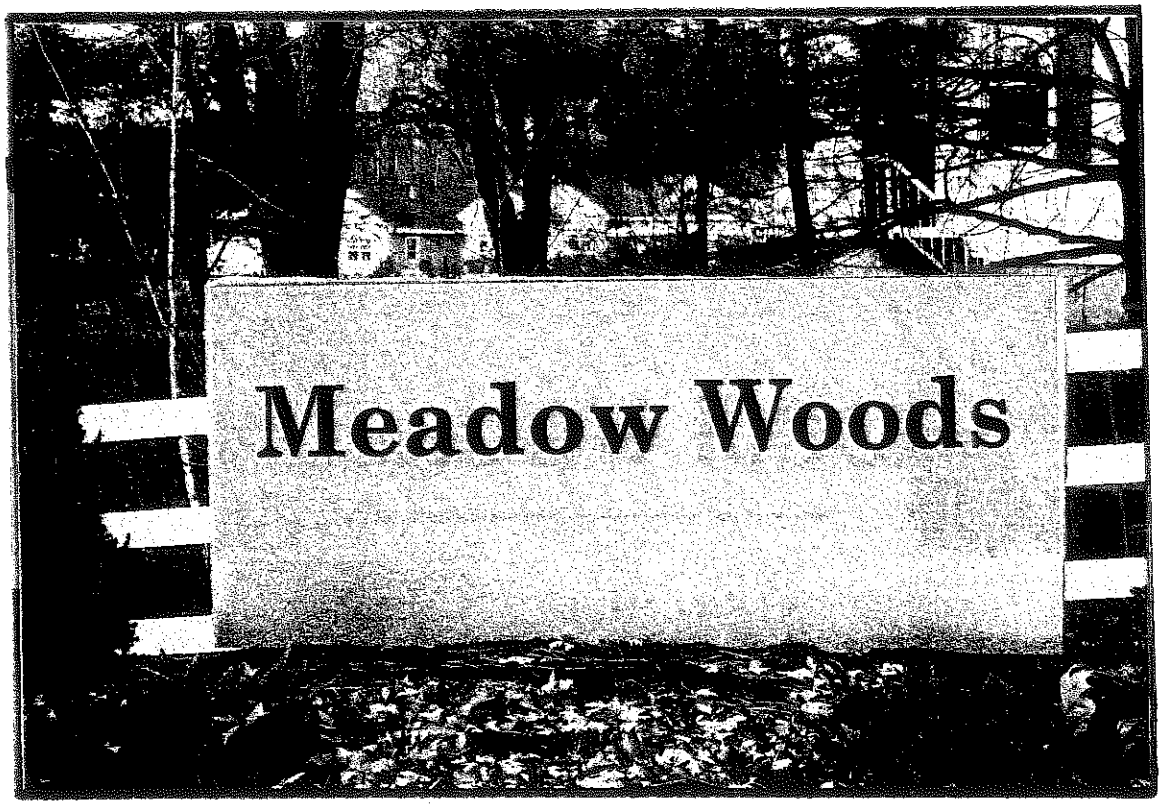
Matthew W. Ek, PLS
Project Manager

MWE:mwe/jc
Enc.

cc: North Star Enterprises Inc.

Meadow Woods Entrance Sign Example

This is an example of the proposed entrance sign. We are proposing a granite entrance sign on the side of the entrance as shown on the plans. Our sign may have a small graphic added to the sign.



TYPE:

CATALOG #:

McGRAW-EDISON

DESCRIPTION

The Traditionaire outdoor luminaire displays the old-fashioned charm of traditional area lighting, enhancing any setting with a distinctive styling. U.L. 1572 listed and CSA certified for wet locations.

APPLICATION

As a decorative luminaire, the Traditionaire tastefully complements the architectural and environmental design of estates, parks, motels, restaurants, apartments, churches, institutions and roadways.

SPECIFICATION FEATURES

A--Cupola

Decorative cupola conceals optional photocontrol.

B--Cover

Hinged, die-cast aluminum cover has steel hinge pins and captive cover-retaining screws.

C--Lens Panels

Injection-molded, prismatic acrylic refractor panels provide Type III asymmetric or Type V symmetric light pattern.

D--Socket

Porcelain enclosed, mogul-base socket is positioned to provide proper location of the lamp for maximum optical efficiency.

E--Housing

Single-piece, die-cast aluminum housing has integral base and lens supports and is finished in black polyester powder coat.

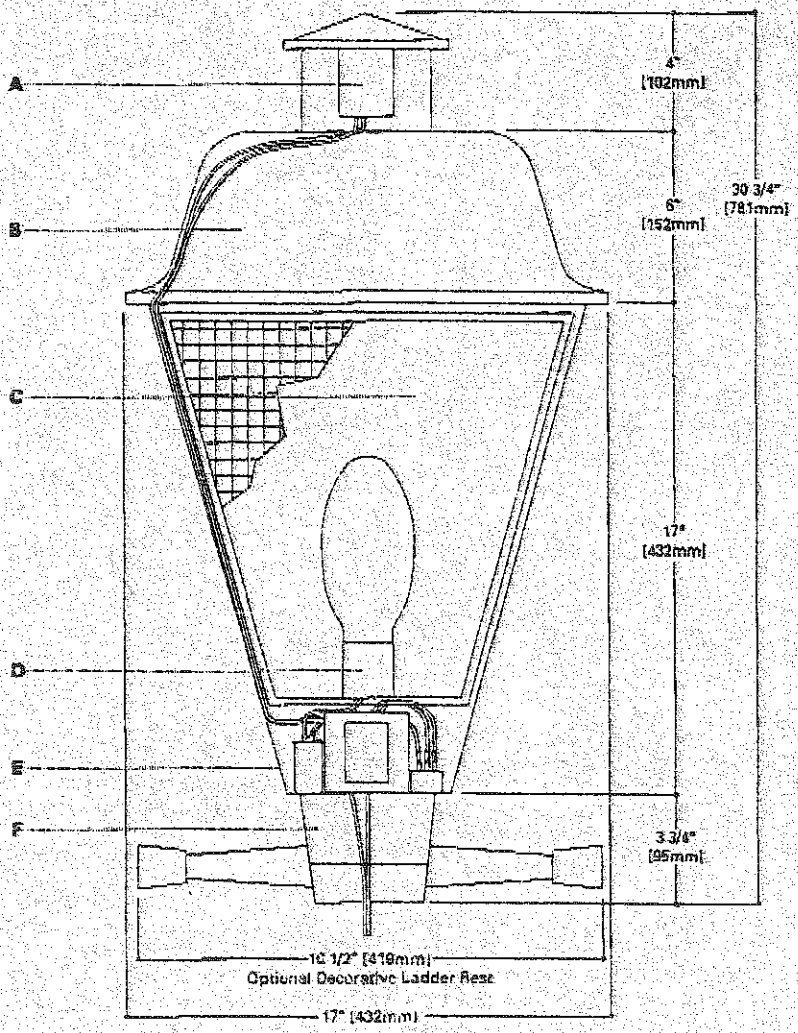
F--Mounting

Integral self-aligning pole top fitter fits 3" O.D. poles or vertical tenons.

TRTRADITIONAIRE

70-250W
High Pressure Sodium
Metal Halide

POST-TOP
AREA LUMINAIRE



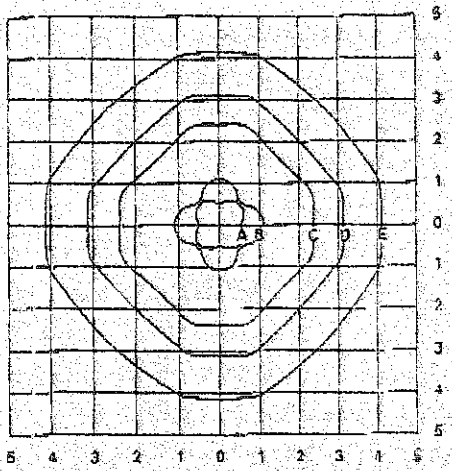
ENERGY DATA

High Reactance Ballast Input Watts
70W HPS NPF/HPF (95 Watts)
100W HPS NPF/HPF (130 Watts)
100W MH HPF (128 Watts)
150W HPS HPF (190 Watts)

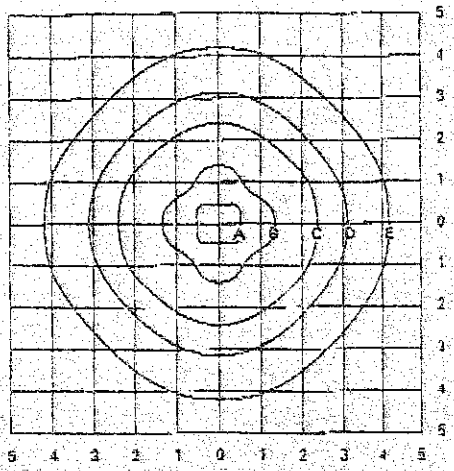
CWI Ballast Input Watts
250W HPS HPF (300 Watts)

CWA Ballast Input Watts
150W MH HPF (210 Watts)
175W MH HPF (210 Watts)
250W MH HPF (295 Watts)

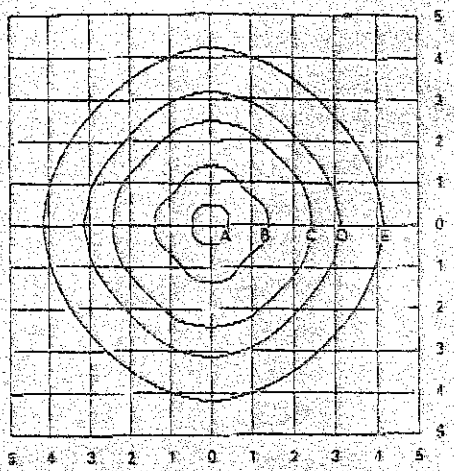
PHOTOMETRICS



TR-1
TR1383
150-Watt HPS, Type V Distribution
16,000-Lumen Clear Lamp



TR-2
TR1324
250-Watt HPS, Type V Distribution
30,000-Lumen Clear Lamp



TR-3
TR1334
250-Watt MH, Type V Distribution
20,500-Lumen Clear Lamp

Footcandle Table for TR-1, TR-3

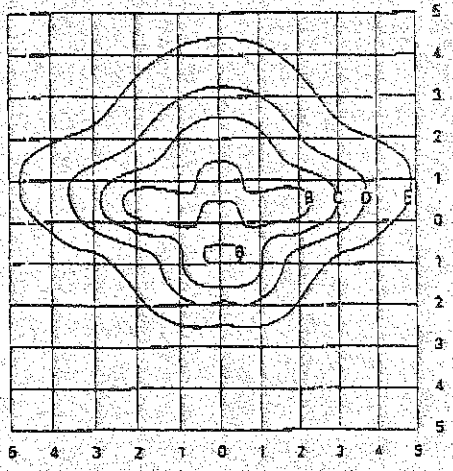
Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	B	C	D	E
15'	3.54	1.77	0.89	0.44	0.18
20'	2.00	1.00	0.50	0.25	0.10
25'	1.28	0.64	0.32	0.16	0.06

Footcandle Table for TR-2, TR-4

Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	B	C	D	E
15'	5.54	2.77	1.39	0.69	0.28
20'	3.12	1.56	0.78	0.39	0.16
25'	2.00	1.00	0.50	0.25	0.10



TR-4
TR1224
250-Watt HPS, Type II Distribution
27,500-Lumen Clear Lamp

ORDERING INFORMATION

SAMPLE NUMBER: TR12811

TR | 1 | 2 | 3 | 3 | 1 | | |

Product Family
TR=Traditionaire

Mounting
1=Post-Top
2=Pendant

Distribution
2=Asymmetric Type III
3=Symmetric Type V

Ballast/ Lamp Type*
2=CWA/HPS
3=CWA/MH
6=CWI/MH*
7=CWI/HPS*
8=Hi-X/ HPS
9=Reac./ HPS

Lamp Wattage
0=50W
1=70W
2=100W
3=150W/ 175W
4=250W

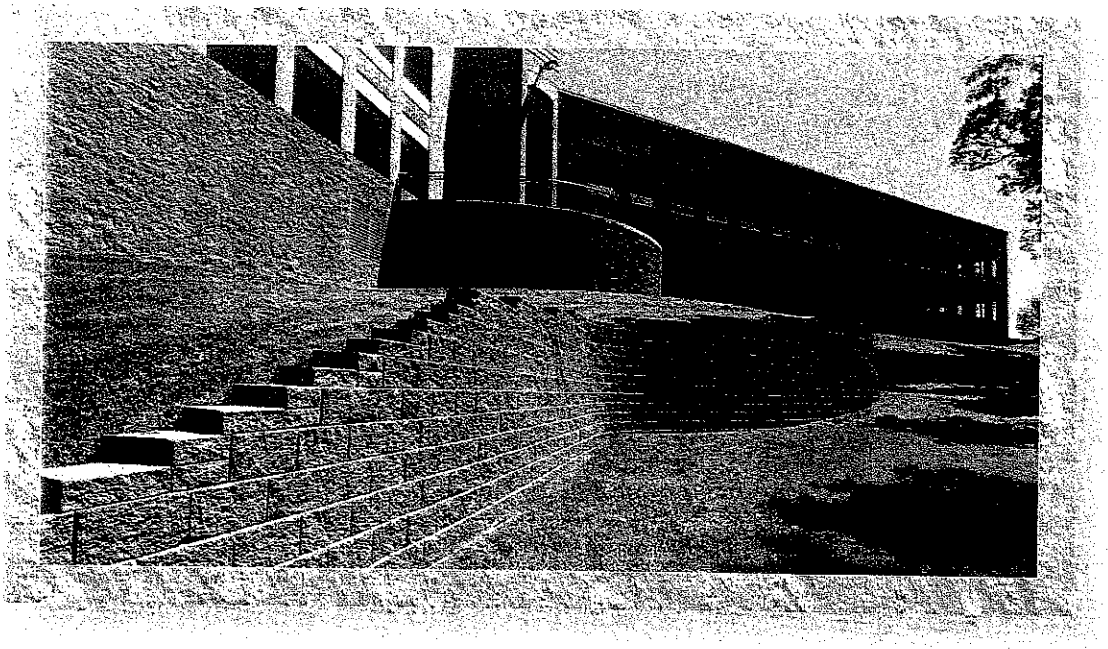
Voltage*
1=120
2=208
3=240
4=277
5=480
7=Dual-Tap
8=Triple-Tap wired 347*
9=Multi-Tap wired 277*

Option (add as suffix)
R=NEMA Twistlock Photocontrol Receptacle
L=Lamp included

Accessories (order separately)
TA1BK=Decorative Ladder Rest (Field installed)
OA1015=NEMA Photocontrol, Multi-Tap—105-285V
OA1027=NEMA Photocontrol, Multi-Tap—480V
OA1291=NEMA Photocontrol, Multi-Tap—347V

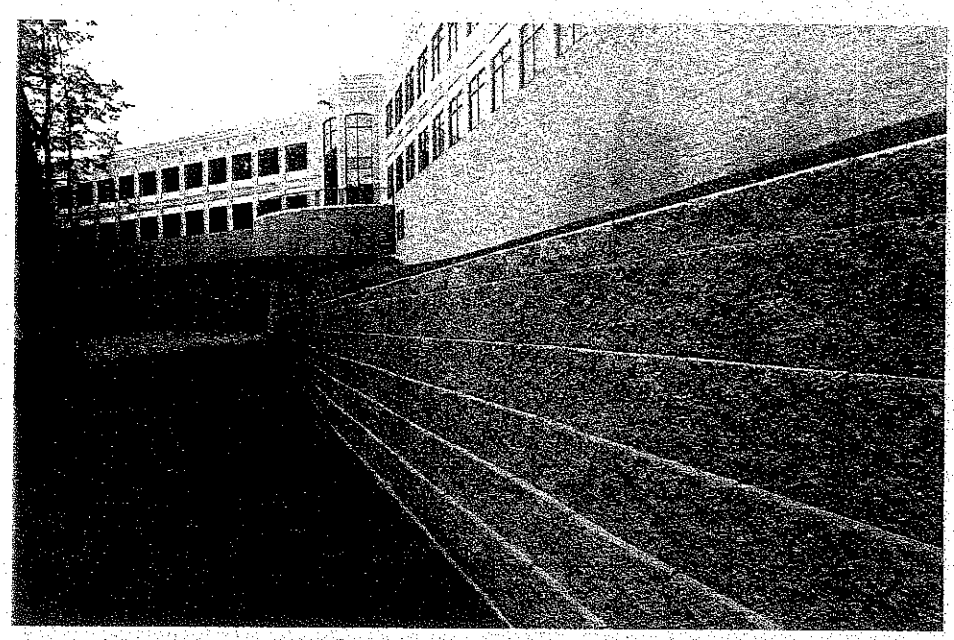
Catalog Number Type III	Type V	Lamp Wattage	Lamp Type/Base	Ballast Type/ Power Factor	Voltage	Net Wt. (lbs.)	Shipping Volume (cu. ft.)
TR12811	TR13811	70	HPS/Mogul	Hi-X/HPF	120V	20	5.82
TR12821	TR13821	100	HPS/Mogul	Hi-X/HPF	120V	20	5.82
TR12831	TR13831	150	HPS/Mogul	Hi-X/HPF	120V	20	5.82
TR12241	TR13241	250	HPS/Mogul	CWA/HPF	120V	20	5.82
TR12331	TR13331	175	MH/Mogul	CWA/HPF	120V	22	5.82
TR12341	TR13341	250	MH/Mogul	CWA/HPF	120V	22	5.82

NOTES: * All lamps are mogul-base except 150W-MH and lower are medium-base. Lamps not included.
* CWI ballast required in Canada for line to line voltage fixtures. Not for use in the United States.
* Products also available in non-US voltages and 50hz for international markets. Consult factory for availability and ordering information.
* Multi-Tap ballast is 120/208/240/277V wired 277V. Triple-Tap ballast is 120/277/347V wired 347V.

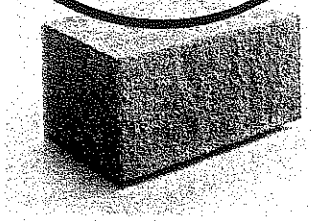


Architects, engineers and contractors are choosing the Anchor Diamond Pro™ to create flexible, cost-effective solutions for a broad range of large commercial, municipal and residential wall projects. For contours that shape new environments, colors that blend with the surroundings, the natural choice is Anchor Diamond Pro.

ANCHOR WALL SYSTEMS

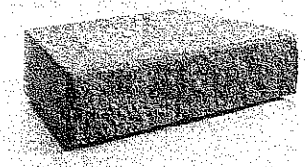


Anchor Diamond Pro Beveled Unit

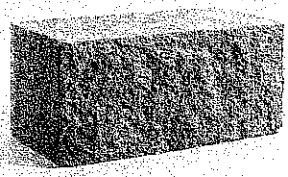


Anchor Diamond Pro Straight Unit

The Anchor Diamond Pro's one square foot of wall face makes estimating and construction easier. The integral rear lip eliminates guesswork and greatly simplifies your work with easy installation. Labor costs are also reduced by automatically delivering a quick uniform setback. The warm earthtone and rugged natural rock texture make the Anchor Diamond Pro an attractive addition to any landscape.



Anchor Diamond Pro Cap Unit



Anchor Diamond Pro Corner Unit

ANCHOR DIAMOND PRO SPECIFICATIONS*

Anchor Diamond Pro Beveled Unit

Approximate Dimensions	8" x 18" x 12"
Approximate Weight	85 lbs.
Approximate Coverage	1.0 sq. ft.
Setback (batter)	1" (approx. 7.1°)

Anchor Diamond Pro Straight Unit

Approximate Dimensions	8" x 18" x 12"
Approximate Weight	86 lbs.
Approximate Coverage	1.0 sq. ft.
Setback (batter)	1" (approx. 7.1°)

Anchor Diamond Pro Cap Unit

Approximate Dimensions	4" x 17.25" x 10"
Approximate Weight	40 lbs.

Anchor Diamond Pro Corner Unit

Approximate Dimensions	8" x 18" x 9"
Approximate Weight	101 lbs.

*Actual weight, size and availability may vary by region. Specifications may vary or change without notice. See your Anchor representative for details and specific block dimensions.

Anchor Wall Systems products are backed by a 5-Year Limited Warranty. For a complete copy of the Anchor Wall Systems Warranty visit your local distributor or manufacturer or contact Anchor Wall Systems at 1-800-473-4452 or www.anchorwall.com.

ANCHOR WALL SYSTEMS®

6101 Baker Road, Suite 201, Minnetonka, MN 55345-5973

Peoples Heritage Bank, N.A.

One Portland Square
P.O. Box 9540
Portland, ME 04112-9540

1-800-462-3666
Tel: 207 761-8500

December 11, 2000

Peoples
A Bankmaine Company

Planning Board
City of Portland
389 Congress Street
Portland, ME 04101

Dear Planning Board:

Peoples Heritage Bank has reviewed, on a preliminary basis, the financial statement of North Star Enterprises and its principals. Based on our review of the financial statements, we feel that the developer and its principals have adequate financial resources to finance the proposed Meadow Woods project on Stuart Street, Portland, ME.

The letter should not be construed as a commitment by the bank of fund the proposed project. We are processing a loan request and will make a final determination once all relevant information has been obtained.

Sincerely,

Richard A. Blake
Senior Vice President

Encl.

OPTION AGREEMENT

AGREEMENT made and entered into as of this 11th day of December 2000 by and between Charles B. Rodway, Jr. of Poland, Maine, ("Seller") and North Star Enterprises, Inc., a Maine corporation, ("Buyer")

WITNESSETH AS FOLLOWS:

IN CONSIDERATION of One Dollar ($1.00) and other good and valuable consideration (the "Option Consideration"), the receipt of which is hereby acknowledged by Seller, and of the mutual covenants and promises hereinafter set forth, Seller and Buyer agree as follows:

1. **GRANT OF OPTION.** Seller hereby grants to Buyer the exclusive and irrevocable option to purchase, on the terms and conditions contained in this Agreement, the real estate consisting of five (5) lots of Seller's located on Harmony Road in Portland, Maine and identified more particularly as Lots # 336-L lots 8-12 in the Assessor's Office in Portland, Maine (the "Premises").

2. **EXPIRATION; ADDITIONAL OPTION.** This Option shall expire on March 12, 2001 at midnight, Maine time.

3. **NOTICE OF EXERCISE.** This Option may be exercised only by Buyer giving written notice of election to exercise to Seller in the manner set forth in Paragraph 9(b) below.

4. **FAILURE TO EXERCISE.** In the event that Buyer fails to exercise this Option, the Option Consideration shall be retained by Seller and neither Seller nor Buyer shall have any further rights or claims against the other.

5. **EXERCISE.** In the event that Buyer exercises this Option as provided herein, the following provisions shall be applicable:

(a) **Purchase Price.** Subject to any adjustments and prorations hereinafter described, the purchase price for the Premises shall be Fifteen Thousand Dollars ($ 15,000), payable

Charles B. Rodway, Jr.

by certified check, wire transfer or bank cashier's check at the closing. The Option Consideration shall be credited against the purchase price at the closing.

(b) Title, Covenant Against Further Encumbrances. Seller shall convey the Premises to Buyer at the closing in fee simple with good and marketable title, free and clear of liens and encumbrances. In the event that Buyer determines upon examining title to the Premises that Seller would be unable to convey title as aforesaid, Seller shall be given a reasonable period of time after notice from Buyer, not to exceed sixty (60) days, in which to remedy any title defects. In the event that said defects cannot be corrected or remedied within said time period, then the Option Consideration and the Additional Option Consideration, if applicable, shall be returned to Buyer and this Agreement shall terminate. Buyer may, however, elect to close notwithstanding such defects as may exist. Seller and Buyer understand and agree that any mortgages and liens on the Premises shall not be considered title defects provided that the same shall be discharged at or prior to the closing at Seller's expense. Seller agrees that it will not further encumber or permit to be encumbered the Premises by any liens, mortgages, attachments, covenants, restrictions or easements after the Effective Date of this Option.

(c) Closing. The closing shall take place thirty (30) days after the date this Option is exercised, at 10:00 a.m., local time, at the offices of Bernstein, Shur, Sawyer and Nelson, 100 Middle Street, Portland, Maine, or at another time and place if Seller and Buyer mutually so agree in writing. At the closing, Seller shall execute and deliver to Buyer, against payment of the balance of the purchase price, a Warranty Deed to the Premises with full Warranty Covenants in accordance with the Short Form Deeds Act, 33 M.R.S.A. 761 et seq. (the "Deed").

Seller further agrees to execute and deliver to Buyer at the closing such Affidavits and Certificates as are reasonably necessary for Buyer's acquisition and financing of the Premises including without limitation a Certificate of Non-Foreign Status (as required by Internal Revenue Service

regulations) and a title insurance "Owner's Affidavit" regarding mechanics liens and persons in possession and, if Seller is a corporation, partnership or other legal entity, satisfactory evidence of authority to convey and good standing.

(d) Adjustments, Prorations and Closing Costs.

i. Real estate taxes and assessments shall be prorated as of the closing on the basis of the latest available tax bill.

ii. The Maine real estate transfer tax shall be paid for by Seller and Buyer in accordance with 36 M.R.S.A. 4641-A.

iii. The recording fee for the deed of conveyance and any expenses related to any mortgage which Buyer may grant to a lender in connection with the purchase of the Premises shall be paid for by Buyer.

iv. A portion of the purchase price shall be withheld at the closing by Buyer if required by 36 M.R.S.A. § 5250-A.

(e) Possession. Seller shall deliver possession of the Premises to Buyer at the closing, free of all leases, tenancies or occupancies by any person.

(f) Conditions Precedent to Buyer's Obligation to Close. Buyer's obligation to close is subject to the satisfaction, at or before the closing of all of the following conditions:

i. All representations and warranties of Seller contained in this Agreement shall be true as of the closing.

ii. Buyer shall have received financing from a lender for a mortgage loan of not less than Fifteen Thousand Dollars ($ 15,000), upon such terms and conditions as may be satisfactory to Buyer.

iii. Buyer shall have received all permits, licenses and approvals

necessary for Buyer's intended use of the Premises and shall have satisfied itself of the right to use Harmony Road for drainage of water from the Premises and from Buyer's adjoining property to the city owned storm water drainage system.

In the event that any of the foregoing conditions are not satisfied prior to or at the closing, Buyer shall have the option to terminate this Agreement and receive back the Option Consideration, except should any of Seller's representations or warranties prove untrue then Buyer shall have the right to require Seller at Seller's expense to make the Premises conform thereto.

(h) Default; Remedies. In the event that Seller fails to close hereunder for a reason other than the default of Buyer, Buyer shall have all remedies available at law and equity including the right of specific performance. In the event that Buyer defaults in the performance of its obligations hereunder after exercise of this Option, Seller shall retain the Option Consideration as full and complete liquidated damages in lieu of any other legal or equitable remedy, in which case this Agreement will terminate and neither party will be under any further obligation hereunder.

6. REPRESENTATIONS AND WARRANTIES OF SELLER. Seller represents and warrants to Buyer that the following are true as of the date of this Agreement and will be true as of the closing:

(a) The present use of the Premises is in full compliance with applicable zoning and land use laws, and all other applicable laws, ordinances and regulations.

(b) The Premises are free of pollutants, contaminants, special wastes, underground storage tanks, radon, waste oil, petroleum, asbestos, lead paint and any other dangerous, hazardous, biomedical, toxic or radioactive substances, materials or wastes. The terms used in the foregoing sentence shall include, without limitation, all substances, materials, etc., designated by such terms under any laws, ordinances or regulations, whether federal, state or local.

(e) The Premises either do not now and will not as of the closing date abut any farmland registered under Chapter 2-A of Title 7 of the Maine Revised Statutes Annotated or if the Premises do abut any such registered farmland they are and shall be as of the closing date exempt from the provisions of Chapter 2-A of Title 7 of the Maine Revised Statutes Annotated.

(f) There are rights of ingress and egress in perpetuity from the Premises to public highways or roads for both vehicular and pedestrian traffic.

7. BROKERAGE. Seller warrants and represents to Buyer that Seller has not dealt or had contact with any broker in connection with this transaction.

8. INSPECTION. Buyer or its agents may enter the Premises at all reasonable times prior to the closing in order to inspect the same and may conduct studies, tests, surveys and take samples so that Buyer can determine the suitability of the Premises of Buyer's intended use. Buyer's inspection of the Premises, pursuant to this paragraph, shall not be deemed a waiver of any of the representations and warranties made by Seller hereunder.

9. RECORDING OF OPTION. Seller and Buyer agree that this Option may not be recorded but further agree that the Memorandum of Option may, at the option and request of the Buyer, be executed and acknowledged by the Seller to be recorded (if Buyer so desires) at the Registry of Deeds for the County in which the Premises are located.

10. MISCELLANEOUS.

(a) Time. Time is of the essence of this Agreement.

(b) Notices. All notices, demands and other communications hereunder shall be in writing and shall be given either (i) by first class mail, postage prepaid, registered or certified, return receipt requested, to Seller at the address set forth below; (ii) by hand delivery to Seller's address set forth below. All notices shall be deemed to have been duly given if postmarked prior to the expiration

date and time specified herein (in the case of mailing) or upon delivery (if hand delivered.

TO SELLER:

Charles B. Rodway, Jr.
70 Jordan Shore Drive
Poland, Maine 04274.

TO BUYER:

North Star Enterprises, Inc.
21 Stuart Street
Portland, Maine 04103

Either party may change its address or its Fax number for purposes of this subparagraph by giving the other party notice of the new address or Fax number in the manner described herein.

(c) Binding Effect. This Agreement will inure to the benefit of and bind the respective successors and assigns of Seller and Buyer.

(d) Construction. As used in this Agreement, the singular number shall include the plural, the plural the singular, and the use of one gender shall be deemed applicable to all genders. This Agreement shall be governed by and construed in accordance with the laws of Maine. All representations and warranties made by Seller herein shall survive the closing. If any provision of this Agreement is determined to be invalid or unenforceable, it shall not affect the validity or enforcement of the remaining provisions hereof.

(e) Attorney's Fees. If any legal action is brought by either party to enforce any provisions of this Agreement, the prevailing party shall be entitled to recover from the other party its reasonable attorneys' and paralegals' fees and court costs in such amounts as shall be allowed by the court.

(f) Effective Date. The Effective Date of this Option shall be deemed to be the date first set forth above in this Agreement.

IN WITNESS WHEREOF, Seller and Buyer have executed this Agreement as of the date first above written.

SELLER:

_____
Charles B. Rodway, Jr.

BUYER: NORTH STAR ENTERPRISES, INC.

By_____
Conrad C. Clark
Its Duly Authorized Representative

Peoples Heritage Bank, N.A.

One Portland Square
P.O. Box 9540
Portland, ME 04112-9540

1-800-462-3666
Tel: 207-761-8500

December 11, 2000

Peoples
A Banknorth Company

Mr. Conrad Clark
21 Stuart Street
Portland, Maine 04103

RE: North Star Enterprises, Inc.

Dear Conrad:

Per our earlier discussion, Peoples Heritage Bank has agreed to provide the City of Portland with a letter of financial capability in regard to the proposed Meadow Woods project. This letter is attached.

Please allow me to re-emphasize that this letter should not be considered a commitment of the Bank to provide financing to North Star Enterprises. Such a commitment could be provided only after the Bank completes a thorough and satisfactory analysis of both the project and the strength of the partners. Given our initial review of the request, it is highly likely that we would proceed only if we could obtain a letter of credit from Mr.Yarhi in an amount equal to that of the site loan.

Thank you for your interest in Peoples Heritage Bank. Please don't hesitate to call me at 828-7026 if you have any questions or if I may be of further assistance.

Sincerely,

Ellen Niewoehner

Ellen Niewoehner
Vice President
Commercial Lending

cc: Randy Blake

Peoples Heritage Bank, N.A.

One Portland Square
P.O. Box 9540
Portland, ME 04112-9540

1-800-462-3666
Tel: 207-761-8500

December 11, 2000

Peoples
A Banknorth Company

Planning Board
City of Portland
389 Congress Street
Portland, ME 04101

Dear Planning Board:

Peoples Heritage Bank has reviewed, on a preliminary basis, the financial statement of North Star Enterprises and its principals. Based on our review of the financial statements, we feel that the developer and its principals have adequate financial resources to finance the proposed Meadow Woods project on Stuart Street, Portland, ME.

The letter should not be construed as a commitment by the bank of fund the proposed project. We are processing a loan request and will make a final determination once all relevant information has been obtained.

Sincerely,

Richard A. Blake
Senior Vice President

Encl.

Date: 12/01/00
JN: 1350.10
Project: Stuart Street (Meadow Woods)
Subject: Project Review
To: Kandi Talbot
From: Steve Bushey

This review was based upon the following submission items:

- Revised drawings dated 11/28/00

Comments:

1. Detail shows 22' wide road versus Site Plan, which shows 24' wide road. A detail shows curb on both sides whereas the Plan shows the inside of the loop road as uncurbed. It should be clarified if the inside of the loop will be curbed. Planning staff should review the acceptability of sidewalk on the inside of the loop.

2. The plans should identify the location of the control panel for the pump station. In addition the engineer should provide documentation as to the sizing of the station and available capacity for emergency purposes in the event of a power outage.

3. A 50' wide drainage/utility easement agreement has been obtained for the Rodway parcel. Is it necessary to have any further easement rights within Harmony Road or is that portion of the paper street City of Portland Property?

Sebago Technics

Engineering & Planning for the Future

November 28, 2000
99172

Planning Board
City of Portland
389 Congress Street
Portland, ME 04101

Final Plan Submission of Homes at Meadow Woods

Dear Members of the Board:

On behalf of North Star Enterprises Inc., I am pleased to submit this final subdivision submission of Homes at Meadow Woods, a 14-unit condominium project. Since our second workshop meeting with you on November 14th, we have made a few changes.

The major change was the relocation of the proposed sidewalk. The sidewalk was shown as a painted area on the 24-foot wide roadway. This painted area has been removed from the roadway and a 5-foot wide paved sidewalk has been added to the center island. A grass esplanade was placed between the 24-foot wide road and the 5-foot sidewalk to allow the same drainage pattern to occur. Catch Basin #2 was relocated and the lengths and slopes of the connected storm drains were adjusted. The storm drainage calculations were checked and the additional pavement and slope adjustments were minimal. No down stream adjustments were needed.

The 50-foot wide drainage easement over land of Charles Rodway has been delineated and dimensioned on the subdivision plan. The deed for this easement will be executed and provided to the Planning Department prior to any building permit applications.

A sign has been added to the entrance drive stating that no on-street parking is allowed.

The vegetative buffer is delineated on the subdivision and the landscape plans. A note was also added to both plans stating: "The vegetative buffer as shown on this plan shall be flagged for review by the City Arborist prior to construction. The areas lacking sufficient vegetation shall have 6 foot evergreen trees placed 10 to 15 feet on center in a staggered formation prior to construction." This note was reviewed and approved by Jeff Tarling, the City Arborist.

One Chabot Street P.O. Box 1339 Westbrook, Maine 04098-1339 207-856-0277 Fax 207-856-2206

The curbing at the entrance shall be granite until the end of the entrance radius per the note on the plan. The curbing on site shall be vertical bituminous at the sidewalk and bituminous cape cod on the right side of the entrance drive, as shown on the plan.

The declaration condominium documents have been included in this submission for review by the City attorney.

These are the limits of the changes that have been made. We look forward to meeting with you to discuss these modifications.

Upon your review of this letter and application package, please call with any questions or comments. We look forward to meeting with the Board. Thank you for your consideration.

Sincerely,

SEBAGO TECHNICS, INC.

Matthew W. Ek

Matthew W. Ek, PLS
Project Manager

MWE:mwe/jc
Enc.

cc: North Star Enterprises Inc.

Date: 11/10/00
JN: 1350.10
Project: Stuart Street (Meadow Woods)
Subject: Project Review
To: Steve Bushey
From: John Iennaco

This review was based upon a site visit and the following submission items:

- Lighting Plan by Cooper Lighting dated 1/31/00
- Review comments by Steve Bushey dated 7/21/00
- Secondary submission letter dated 9/21/00 w/attachments
- Drawings #1 - #9 revised dated 9/21/00
- Drawings #1 - #9 revised dated 10/25/00
- Letter from Sebago Tech. To the Planning Board Dated 10/25/00

Comments:

1. Detail shows 22' wide road versus Site Plan, which shows 24' wide road. A detail shows curb on both sides whereas the Plan shows the inside of the loop road as uncurbed.

2. Lighting plan dated 1/31/00 by Cooper Lighting does not show current site layout for its base.

3. Drawing #9 previously showed a spillway crest elevation of 83.00' which is below the 10-year stage of 83.6' shown on Drawing #8. This has been corrected on the revised drawings.

4. Your previous comments suggested that the Applicant investigate alternate locations for the sewage pump station and showing the location of the control panel. These items were apparently not addressed in the 10/25/00 letter or revised Drawings.

5. The secondary submission letter dated 9/22/00 indicates that abutting houses were added to the Subdivision Plan per previous comments however these are not shown on the Drawings.

6. Exact locations of curb types and transitions are still not shown on the site Layout Plan per previous review comments.

7. Per previous comments, clarification has been provided as to the location of storm water travel after being discharged from the detention basin. The detention basin discharge is directed across the Rodway parcel by a proposed storm drain to a proposed storm drain on Harmony Street. The proposed storm drain on Harmony discharges to an existing catch basin on Milton Street.

8. The Secondary Submission Letter indicates a 50' wide drainage/utility easement agreement has been obtained for the Rodway parcel. The note on the Drainage Plan that previously showed a 60' wide R/W at this location was deleted from the Drainage Plan revised 10/25/00. The Subdivision Plan does not show a proposed easement at this location.

9. The Landscape Plan was revised to show a combination of stockade fence and plantings which generally surround the site and provide a buffer to abutting residences.

10. Additional Storm drains were added which allow a 10' buffer to be maintained around portions of the site's perimeter as shown on Drawing #7. A note on Drawing #7 apparently allows the buffer to be cleared provided 6' evergreen trees are planted 10' to 15' apart.

C: Kandi Talbot

From: Kandi Talbot
To: Penny Littell
Date: Wed, Oct 25, 2000 1:53 PM
Subject: Stuart Street

I talked to the applicant regarding the easement agreement for the Rodway property. This is just an option agreement at this time. What I will have to do then is make sure I have a condition of approval stating that an executed easement deed will be submitted prior to issuance of a building permit. Is this correct? Thanks.

ADDITIONAL CALCULATIONS

CLARK PROPERTY

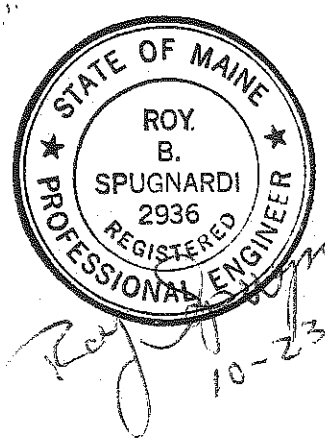
HOMES AT MEADOW WOODS

PORTLAND, MAINE

PREPARED BY: SPUGNARDI ASSCCIATES

FOR: SEBAGO TECHNICS, INC.

October 23, 2000



Project Clark Property By RS Date 10-20

Location Stuart St Checked ___ Date ___

Circle one: Present Developed SA-1

2/82

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Scarified D	Bare 1/4 AC	87			3.65	317
D	Woods good Cover	77			3.29	253

1/ Use only one CN source per line. Totals = 6.94 570

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{570}{6.94} = 82$ Use CN = 82

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

3

Project Clarke Property By RJ Date

Location Stuart St Checked Date

Circle one: Present Developed — Area 1

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

		Segment ID			
Sheet flow (Applicable to T_c only)					
1. Surface description (table 3-1)			Grass		
2. Manning's roughness coeff., n (table 3-1)			.15		
3. Flow length, L (total L ≤ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		3		
5. Land slope, s	ft/ft		.02		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr		.41	+	- .41
Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)			Woods		
8. Flow length, L	ft		494		
9. Watercourse slope, s	ft/ft		.04		
10. Average velocity, V (figure 3-1)	ft/s		3.2		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		.043	+	- .04
Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, P_w	ft				
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft		.09		
15. Channel slope, s	ft/ft		.01		
16. Manning's roughness coeff., n			.04		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s		1.5		
18. Flow length, L	ft		134		
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		.02	+	- .02
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				0.47

28.2 min

Project _____ By ____ Date _____

Location _____ Checked ____ Date _____

Circle one: Present (Developed) SR 1 P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Scantic D	Housing	98			.14	13.7
D	Pmt	98			.21	20.6
D	grass	80			.23	18.4
					.58	52.7

1/ Use only one CN source per line. Totals =

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{52.7}{.58} = 90.8$ Use CN = 91

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____ 5

Location SA 1 P Checked _____ Date _____

Circle one: Present (Developed) SA 1 P

Circle one: (T_c) T_t through subarea T CB #1

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)		grass		
2. Manning's roughness coeff., n (table 3-1)		.15		
3. Flow length, L (total L ≤ 300 ft)	ft	63		
4. Two-yr 24-hr rainfall, P_2	in	3		
5. Land slope, s	ft/ft	.06		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.075	+	- .075

4.5 min

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		Pave		
8. Flow length, L	ft	179		
9. Watercourse slope, s 5.029	ft/ft	.028		
10. Average velocity, V (figure 3-1)	ft/s	3.4		
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.014	+	- .014

.84 min

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2	.785	.785		
13. Wetted perimeter, P_w	ft	3.14	3.14		
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft	.25	.25		
15. Channel slope, s	ft/ft	.005	.005		
16. Manning's roughness coeff., n		.009	.009		
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s	5.2	5.2		
18. Flow length, L	ft	83	62		
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.004	+ .003	- .007	~4 min

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr .096

5.76 min

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____ 6

Location SAZP Checked _____ Date _____

Circle one: Present Developed — TO CR 2

Circle one: (T_c) T_t through subarea — Thru Pond

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)		pvmt	grass	
2. Manning's roughness coeff., n (table 3-1)		.011	.15	
3. Flow length, L (total L ≤ 300 ft)	ft	33	22	
4. Two-yr 24-hr rainfall, P_2	in	3	3	
5. Land slope, s	ft/ft	.036	.25	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.007	+ .02	= .027

1.62 min

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		Grass		
8. Flow length, L	ft	157		
9. Watercourse slope, s	ft/ft	.035		
10. Average velocity, V (figure 3-1)	ft/s	3		
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.015	+	= .015

.9 min

Channel flow		Segment ID		
		30" RCP	30" RCP	
12. Cross sectional flow area, a	ft^2	.785	.785	
13. Wetted perimeter, p_w	ft	3.14	3.14	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	.25	.25	
15. Channel slope, s	ft/ft	.005	.005	
16. Manning's roughness coeff., n		.009	.009	
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s	5.2	5.2	
18. Flow length, L	ft	83	62	
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.004	+ .003	= .007

.42 min

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr .049

2.94

Project _____ By ____ Date _____ 7

Location _____ Checked ____ Date _____

Circle one: Present (Developed) SR2P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Soils D	Pmt	98			.194	19.6
D	Grass	80			.34	27.2
	Totals =				.53	46.8

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{46.8}{.53} = 87.3$ Use CN = 88

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

Project _____ By _____ Date _____ 8

Location _____ Checked _____ Date _____

Circle one: Present Developed SR 30

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Scarlo D	Roof Bldg	98			.021	2.35
D	Pvmt	98			.051	5.0
D	grass	80			.020	1.6
					Totals = .095	8.95

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8.95}{.095} = 94.2$ Use CN = 94

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	10	25
Rainfall, P (24-hour)	in	3	4.7	5.5
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)	in			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By ____ Date _____

Location SR 3P Checked ____ Date _____

Circle one: Present Developed

Circle one: (T_c) T_t through subarea

TO CB3 → pond

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
1. Surface description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		.15			
3. Flow length, L (total L ≤ 300 ft)	ft	44			
4. Two-yr 24-hr rainfall, P_2	in	3			
5. Land slope, s	ft/ft	.009			
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.15	+		= .15
Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)		Pvmt			
8. Flow length, L	ft	37			
9. Watercourse slope, s	ft/ft	.066			
10. Average velocity, V (figure 3-1)	ft/s	5.3			
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.001	+		= .001
Channel flow	Segment ID	SD2	SD1		
12. Cross sectional flow area, a	ft^2	.785	.785		
13. Wetted perimeter, P_w	ft	3.14	3.14		
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft	.25	.25		
15. Channel slope, s	ft/ft	.005	.005		
16. Manning's roughness coeff., n		.009	.009		
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s	5.2	5.2		
18. Flow length, L	ft	23	62		
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.004	+ .003	= .007	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				.16

9 min

.06 min

.42 min

9.6 min

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____

Location SR 4e Checked _____ Date _____

Circle one: Present (Developed)

Circle one: (T_c) T_t through subarea

To CB4 → CB2
→ CB1 → Pond

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

		Segment ID		
Sheet flow (Applicable to T_c only)				
1. Surface description (table 3-1)		Pmt		
2. Manning's roughness coeff., n (table 3-1)		.011		
3. Flow length, L (total L ≤ 300 ft)	ft	50		
4. Two-yr 24-hr rainfall, P_2	in	3		
5. Land slope, s	ft/ft	.04		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.02	+	= .02
Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)		Pav		
8. Flow length, L	ft	154		
9. Watercourse slope, s	ft/ft	.034		
10. Average velocity, V (figure 3-1)	ft/s	3.8		
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.011	+	= .011
Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2	12"ø	15"ø	
13. Wetted perimeter, P_w	ft	.70	.785	
14. Hydraulic radius, r = $\frac{a}{P_w}$ Compute r	ft	—	3.14	
15. Channel slope, s	ft/ft	—	.25	
16. Manning's roughness coeff., n		.0415	.005	
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s	.009	.009	
18. Flow length, L	ft	11.0	5.2	
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	171	145	
		.004	+ .007	= .011
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			.0427

2.56 min

use 8 min

Project _____ By ____ Date _____

Location _____ Checked ____ Date _____

Circle one: Present (Developed) SR 4P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
Scant. D	House Roof	98			.04	3.92
D	Pvmt	98			.09	8.82
D	Trees	80			.07	5.60
Totals =					.20	18.34

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{18.3}{.20} = 91.7$ Use CN = 92

2. Runoff

Storm #1	Storm #2	Storm #3
2	10	25
3	4.7	5.5

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

(2

Project _____ By ____ Date _____

Location SR 58 Checked ____ Date _____

Circle one: Present (Developed)

Circle one: (T_c) T_t through subarea

To pond 2

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
1. Surface description (table 3-1)						
2. Manning's roughness coeff., n (table 3-1)						
3. Flow length, L (total L ≤ 300 ft)	ft					
4. Two-yr 24-hr rainfall, P_2	in					
5. Land slope, s	ft/ft					
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr					

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)						
8. Flow length, L	ft					
9. Watercourse slope, s	ft/ft					
10. Average velocity, V (figure 3-1)	ft/s					
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr					

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2	12"	12	12	15	
13. Wetted perimeter, P_w	ft					
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft					
15. Channel slope, s	ft/ft	.01	.07	.013	.005	
16. Manning's roughness coeff., n		.009		.009		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s	6.5	14	7	8.5	
18. Flow length, L	ft	89	60	31	445	
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	.004	+ .001	.001	= .007	.01

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr .08

.06	+		= .06
.007	+		= .007

3.6

4.2

-6

24.6 min

Use 8 min

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present (Developed)

SR SP

13

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Scantic D	Residential (Roof)	87			.16	13.9
D	Housing Roof	98			.03	2.9
D	Grass	80			.134	10.7
D	Pvmt.	98			.016	1.6
					.34	29.1

1/ Use only one CN source per line. Totals =

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{29.1}{.34} = 85.5$ Use CN = **86**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

14

Project _____ By _____ Date _____

Location SR 60. Checked _____ Date _____

Circle one: Present Developed

Circle one: T_c T_t through subarea

To CB 6 Pond

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)			Lawn	
2. Manning's roughness coeff., n (table 3-1)			.15	
3. Flow length, L (total L ≤ 300 ft)	ft		237	
4. Two-yr 24-hr rainfall, P_2	in		3	
5. Land slope, s	ft/ft		.02	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.33	+	= .33

19.8

Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)			UP	
8. Flow length, L	ft		115	
9. Watercourse slope, s	ft/ft		.052	
10. Average velocity, V (figure 3-1)	ft/s		2.2	
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.014	+	= .01

.6

Channel flow		Segment ID		
			SR6 + Pond	
12. Cross sectional flow area, a	ft^2		12 sf	
13. Wetted perimeter, P_w	ft			
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft			
15. Channel slope, s ...16.0/449	ft/ft		.035	
16. Manning's roughness coeff., n			.009	
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s		11.0	
18. Flow length, L	ft		449	
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.01	+	= .01

.6

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr .35

21 min

Project _____ By _____ Date _____ 15

Location _____ Checked _____ Date _____

Circle one: Present (Developed) SR 6 P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Scarlet D	Resid 1/4 Ac	87			.85	74
D	Housing Proj	78			.04	3.9
D	Prmt	98			.10	9.0
D	Grass	80			.21	16.8
					Totals =	1.2 / 103.7

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{103.7}{1.2} = 86.4$ Use CN = 86

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

16

Project _____ By _____ Date _____

Location SR 76 Checked _____ Date _____

Circle one: ~~Present~~ Developed — To CB #11 To pond

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

		Segment ID		
Sheet flow (Applicable to T_c only)				
1. Surface description (table 3-1)			grass	
2. Manning's roughness coeff., n (table 3-1)			.15	
3. Flow length, L (total L ≤ 300 ft)	ft		245	
4. Two-yr 24-hr rainfall, P_2	in		3	
5. Land slope, s	ft/ft		.02	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr	.34	+	- .34
Shallow concentrated flow		Segment ID		
7. Surface description (paved or ~~unpaved~~)			grass	
8. Flow length, L	ft		93	
9. Watercourse slope, s	ft/ft		.02	
10. Average velocity, V (figure 3-1)	ft/s		2.2	
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	.011	+	- .011
Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2		2.40	
13. Wetted perimeter, P_w	ft			
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft			
15. Channel slope, s	ft/ft		.028	
16. Manning's roughness coeff., n			.009	
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s		10.0	
18. Flow length, L	ft		493	
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	.014	+	- .014
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			.36

20.4

.66

.84

21.6 min

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present (Developed) SHT 7P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Sandy D	Roof 1/4 Ac	87			1.64	143
D	House Roof	98			.02	2
D	Grass	84			.16	12.8
					1.82	157.8

1/ Use only one CN source per line. Totals =

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{157.8}{1.82} = 86.7$ Use CN = 87

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____

Location SA 8 P Checked _____ Date _____

Circle one: Present (Developed) — TO CS #8 TO pond

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID			
1. Surface description (table 3-1)			grass		
2. Manning's roughness coeff., n (table 3-1)			.15		
3. Flow length, L (total L ≤ 300 ft)	ft		53'		
4. Two-yr 24-hr rainfall, P_2	in		3		
5. Land slope, s	ft/ft		.02		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr		.10	+	= .10
Shallow concentrated flow		Segment ID			
7. Surface description (paved or unpaved)			grass		
8. Flow length, L	ft		75		
9. Watercourse slope, s	ft/ft		.04		
10. Average velocity, V (figure 3-1)	ft/s		3.2		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		.006	+	= .006
Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2		15"ø		
13. Wetted perimeter, P_w	ft				
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft				
15. Channel slope, s ...7.200...	ft/ft		.035		
16. Manning's roughness coeff., n			.009		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s		6.5		
18. Flow length, L	ft		200		
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		.008	+	= .008
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				.11

6.84 min

Project _____ By ____ Date _____

Location _____ Checked ____ Date _____

Circle one: Present (Developed) SA-9P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Santee						
D	Town Ctr	98			.01	1.96
D	Grass	80			.08	6.4
	Totals =				.11	8.36

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8.36}{.10} = 83.6$ Use CN = 84

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

20

Project _____ By ____ Date _____

Location SA 9P Checked ____ Date _____

Circle one: Present (Developed)

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

		Segment ID		
Sheet flow (Applicable to T_c only)				
1. Surface description (table 3-1)		grass		
2. Manning's roughness coeff., n (table 3-1)		.15		
3. Flow length, L (total L ≤ 300 ft)	ft	85		
4. Two-yr 24-hr rainfall, P_2	in	3		
5. Land slope, s	ft/ft	.02		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	.15	+	= .15

9m

		Segment ID		
Shallow concentrated flow				
7. Surface description (paved or unpaved)		grass		
8. Flow length, L	ft	147		
9. Watercourse slope, s	ft/ft	.05		
10. Average velocity, V (figure 3-1)	ft/s	3.6		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	.01	+	= .01

.6

		Segment ID		
Channel flow				
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	= —
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			= .16

9.6

Project _____ By ____ Date _____ 2-1

Location _____ Checked ____ Date _____

Circle one: Present (Developed) SR-90

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
Sorta D	Housing Roof	98			0.10	9.8
D	Housing Type	87			.20	17.4
D	grass	80			.62	49.6
					Totals =	
					.92	76.8

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{76.8}{.92} = 83.4$ Use CN = 83

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____ 22

Location SR 108 Checked _____ Date _____

Circle one: Present Developed

Circle one: (T_c) T_t through (subarea)

DCB 9, CB4, CB2
CB1 To Pond

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

		Segment ID					
Sheet flow (Applicable to T_c only)		grass					
1.	Surface description (table 3-1)						
2.	Manning's roughness coeff., n (table 3-1) ..	.15					
3.	Flow length, L (total L ≤ 300 ft) ..... ft	112					
4.	Two-yr 24-hr rainfall, P_2 ..... in	3					
5.	Land slope, s ..... ft/ft	.02					
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t ..... hr	.18	+		=	.18	
Shallow concentrated flow		Segment ID					
7.	Surface description (paved or unpaved)						
8.	Flow length, L ..... ft	77					
9.	Watercourse slope, s ..... ft/ft	.04					
10.	Average velocity, V (figure 3-1) ..... ft/s	3.2					
11.	$T_t = \frac{L}{3600\, V}$ Compute T_t ..... hr	.01	+		=	.01	
Channel flow		Segment ID					
12.	Cross sectional flow area, a ..... ft^2	Pipe					
13.	Wetted perimeter, p_w ..... ft	12"					
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft						
15.	Channel slope, s ..1.3%/.413..... ft/ft						
16.	Manning's roughness coeff., n	.031					
17.	$V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V ..... ft/s						
18.	Flow length, L ..... ft	10					
19.	$T_t = \frac{L}{3600\, V}$ Compute T_t ..... hr	413					
20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr	.01	+		=	.01	
							.20

12 min

Project _____ By ____ Date _____

Location _____ Checked ____ Date _____ 23

Circle one: Present Developed SR 10 P

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
Comb. D	Housing 1/4 ac	87			.49	42.6
D	Roof	98			.05	4.9
D	Grass	80			.20	16.0
1/ Use only one CN source per line.		Totals =			.74	63.5

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{63.5}{.74} = 85.8$ Use CN = 86

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By ____ Date _____ 24

Location SR 14P Checked ____ Date _____

Circle one: Present (Developed)

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)		grass		
2. Manning's roughness coeff., n (table 3-1)		.15		
3. Flow length, L (total L ≤ 300 ft)	ft	104		
4. Two-yr 24-hr rainfall, P_2	in	3		
5. Land slope, s	ft/ft	.04		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	.13	+	= .13

7.8

Shallow concentrated flow		Segment ID		
7. Surface description (paved or (unpaved))				
8. Flow length, L	ft	107		
9. Watercourse slope, s	ft/ft	.04		
10. Average velocity, V (figure 3-1)	ft/s	3.2		
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr	.01	+	= .01

6

Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, P_w	ft			
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			.14

8.4 min

Project _____ By ____ Date _____

Location _____ Checked ____ Date _____

Circle one: Present Developed SPLIT.

25

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
D	Scrub Housing (4 ac	87			.17	14.8
D	Grass	80			.15	12.0
	Totals =				.32	26.8

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{26.8}{.32} = 83.7$; Use CN = 84

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2	10	25
Rainfall, P (24-hour) ..... in	3	4.7	5.5
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

HYDROGRAPH # 6 TYPE : COMPUTED FLOOD
DESCRIPTION : SA6P 2YR FLOOD

Peak Discharge	=	1.51 (cfs)
Time to Peak	=	736.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 7 TYPE : COMPUTED FLOOD
DESCRIPTION : SA7P 2 YR FLOOD

Peak Discharge	=	2.37 (cfs)
Time to Peak	=	736.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 8 TYPE : COMPUTED FLOOD
DESCRIPTION : SA8P 2YR FLOOD

Peak Discharge	=	0.16 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 9 TYPE : COMPUTED FLOOD
DESCRIPTION : SA9P 2YR FLOOD

Peak Discharge	=	1.29 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 10 TYPE : COMPUTED FLOOD
DESCRIPTION : SA10P 2YR FLOOD

Peak Discharge	=	1.17 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH REPORT

2P-

RECORD NUMBER : 12
TYPE : COMBINE
DESCRIPTION : COMBINED 10 YR POST

Area =
6.62 Ac

[HYDROGRAPH INFORMATION]

Peak Discharge	=	17.14 (cfs)
Volume	=	1.72 (acft)
Time Interval	=	4.00 (min)
Time to Peak	=	728.00 (min)
Time of Base	=	1472.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 1 TYPE : COMPUTED FLOOD
DESCRIPTION : SA1P 10 YR FLOOD

Peak Discharge	=	1.98 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 2 TYPE : COMPUTED FLOOD
DESCRIPTION : SA2P 10 YR FLOOD

Peak Discharge	=	1.86 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 3 TYPE : COMPUTED FLOOD
DESCRIPTION : SA3P 10 YR FLOOD

Peak Discharge	=	0.34 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 4 TYPE : COMPUTED FLOOD
DESCRIPTION : SA4P 10 YR FLOOD

Peak Discharge	=	0.70 (cfs)
Time to Peak	=	724.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 5 TYPE : COMPUTED FLOOD
DESCRIPTION : SA5P 10 YR FLOOD

Peak Discharge	=	1.04 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 6 TYPE : COMPUTED FLOOD
DESCRIPTION : SA6P 10 YR FLOOD
Peak Discharge..... = 2.86 (cfs)
Time to Peak..... = 736.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 7 TYPE : COMPUTED FLOOD
DESCRIPTION : SA7P 10 YR FLOOD
Peak Discharge..... = 4.42 (cfs)
Time to Peak..... = 736.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 8 TYPE : COMPUTED FLOOD
DESCRIPTION : SA8P 10 YR FLOOD
Peak Discharge..... = 0.32 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 9 TYPE : COMPUTED FLOOD
DESCRIPTION : SA9P 10 YR FLOOD
Peak Discharge..... = 2.58 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 10 TYPE : COMPUTED FLOOD
DESCRIPTION : SA10P 10 YR POST
Peak Discharge..... = 2.22 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 11 TYPE : COMPUTED FLOOD
DESCRIPTION : SA11P 10 YR POST
Peak Discharge..... = 0.93 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)

3a

HYDROGRAPH REPORT

A = 6.62 AC.

RECORD NUMBER : 12
TYPE : COMBINE
DESCRIPTION : COMBINED 25 YR POST

[HYDROGRAPH INFORMATION]

Peak Discharge	=	20.96 (cfs)
Volume	=	2.12 (acft)
Time Interval	=	4.00 (min)
Time to Peak	=	728.00 (min)
Time of Base	=	1472.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 1 TYPE : COMPUTED FLOOD
DESCRIPTION : SA1P 25 YR FLOOD

Peak Discharge	=	2.37 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 2 TYPE : COMPUTED FLOOD
DESCRIPTION : SA2P 25 YR POST

Peak Discharge	=	2.25 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 3 TYPE : COMPUTED FLOOD
DESCRIPTION : SA3P 25 YR POST

Peak Discharge	=	0.41 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 4 TYPE : COMPUTED FLOOD
DESCRIPTION : SA4P 25 YR FLOOD

Peak Discharge	=	0.83 (cfs)
Time to Peak	=	724.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 5 TYPE : COMPUTED FLOOD
DESCRIPTION : SA5P 25 YR FLOOD

Peak Discharge	=	1.27 (cfs)
Time to Peak	=	728.00 (min)
Time Interval	=	4.00 (min)

HYDROGRAPH # 6 TYPE : COMPUTED FLOOD
DESCRIPTION : SA6P 25 YR FLOOD
Peak Discharge..... = 3.51 (cfs)
Time to Peak..... = 736.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 7 TYPE : COMPUTED FLOOD
DESCRIPTION : SA7P 25 YR POST
Peak Discharge..... = 5.39 (cfs)
Time to Peak..... = 736.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 8 TYPE : COMPUTED FLOOD
DESCRIPTION : SA8P 25 YR POST
Peak Discharge..... = 0.39 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 9 TYPE : COMPUTED FLOOD
DESCRIPTION : SA9P 25 YR POST
Peak Discharge..... = 3.21 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)
HYDROGRAPH # 10 TYPE : COMPUTED FLOOD
DESCRIPTION : SA10P 25 YR POST
Peak Discharge..... = 2.72 (cfs)
Time to Peak..... = 728.00 (min)
Time Interval..... = 4.00 (min)

PROJECT SUMMARY

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PROJECT NAME : clark oct

RAINFALL : pocd13

[UNIT HYDROGRAPH]

1 SA1P 2 YR POST
Type TRIANGULAR UH Peak flow 4.815 cfs Peak time 5.466 min

2 SA2P 2 YR POST
Type TRIANGULAR UH Peak flow 4.826 cfs Peak time 5.454 min

3 SA3P 2 YR POST
Type TRIANGULAR UH Peak flow 0.675 cfs Peak time 6.388 min

4 SA4P 2 YR POST
Type TRIANGULAR UH Peak flow 1.691 cfs Peak time 5.366 min

5 SA5P 2R POST
Type TRIANGULAR UH Peak flow 2.848 cfs Peak time 5.418 min

6 SA6P 2 YR POST
Type TRIANGULAR UH Peak flow 3.818 cfs Peak time 14.260 min

7 SA7P 2 YR POST
Type TRIANGULAR UH Peak flow 5.667 cfs Peak time 14.573 min

8 SA8P 2 YR POST
Type TRIANGULAR UH Peak flow 0.930 cfs Peak time 5.368 min

9 SA9P 2YR POST
Type TRIANGULAR UH Peak flow 6.477 cfs Peak time 6.445 min

10 SA10P 2 YR POST
Type TRIANGULAR UH Peak flow 4.151 cfs Peak time 8.089 min

11 SA11P 2 YR POST
Type TRIANGULAR UH Peak flow 2.555 cfs Peak time 5.682 min

[HYDROGRAPH]

1 SA1P 2 YR FLOOD
Type COMPUTED FLOOD Peak flow 1.146 cfs Peak time 728.000 min

Unit hydrograph
1 SA1P 2 YR POST

2 SA2P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 1.023 cfs Peak time 728.000 min

Unit hydrograph

[HYDROGRAPH]

3 SA3P 2 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.208 cfs Peak time 728.000 min

Unit hydrograph
3 SA3P 2 YR POST

4 SA4P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 0.408 cfs Peak time 728.000 min

Unit hydrograph
4 SA4P 2 YR POST

5 SA5P 2 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.551 cfs Peak time 728.000 min

Unit hydrograph
5 SA5P 2R POST

6 SA6P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 1.507 cfs Peak time 736.000 min

Unit hydrograph
6 SA6P 2 YR POST

7 SA7P 2 YR FLOOD
Type COMPUTED FLOOD Peak flow 2.369 cfs Peak time 736.000 min

Unit hydrograph
7 SA7P 2 YR POST

8 SA8P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 0.163 cfs Peak time 728.000 min

Unit hydrograph
8 SA8P 2 YR POST

9 SA9P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 1.289 cfs Peak time 728.000 min

Unit hydrograph
9 SA9P 2YR POST

[HYDROGRAPH]

10 SA10P 2YR FLOOD
Type COMPUTED FLOOD Peak flow 1.166 cfs Peak time 728.000 min

Unit hydrograph
10 SA10P 2 YR POST

11 SA11P 2 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.474 cfs Peak time 728.000 min

Unit hydrograph
11 SA11P 2 YR POST

12 COMBINED 2 YR FLOOD
Type COMBINE Peak flow 9.118 cfs Peak time 728.000 min

Combined Hydrographs
1 SA1P 2 YR FLOOD
2 SA2P 2YR FLOOD
3 SA3P 2 YR FLOOD
4 SA4P 2YR FLOOD
5 SA5P 2 YR FLOOD
6 SA6P 2YR FLOOD
7 SA7P 2 YR FLOOD
8 SA8P 2YR FLOOD
9 SA9P 2YR FLOOD
10 SA10P 2YR FLOOD

PROJECT SUMMARY

PROJECT NAME : clark oct

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RAINFALL : pocd13

[UNIT HYDROGRAPH]

1 SA1P 2 YR POST
Type TRIANGULAR UH Peak flow 4.815 cfs Peak time 5.466 min

2 SA2P 2 YR POST
Type TRIANGULAR UH Peak flow 4.826 cfs Peak time 5.454 min

3 SA3P 2 YR POST
Type TRIANGULAR UH Peak flow 0.675 cfs Peak time 6.388 min

4 SA4P 2 YR POST
Type TRIANGULAR UH Peak flow 1.691 cfs Peak time 5.366 min

5 SA5P 2R POST
Type TRIANGULAR UH Peak flow 2.848 cfs Peak time 5.418 min

6 SA6P 2 YR POST
Type TRIANGULAR UH Peak flow 3.818 cfs Peak time 14.260 min

7 SA7P 2 YR POST
Type TRIANGULAR UH Peak flow 5.667 cfs Peak time 14.573 min

8 SA8P 2 YR POST
Type TRIANGULAR UH Peak flow 0.930 cfs Peak time 5.368 min

9 SA9P 2YR POST
Type TRIANGULAR UH Peak flow 6.477 cfs Peak time 6.445 min

10 SA10P 2 YR POST
Type TRIANGULAR UH Peak flow 4.151 cfs Peak time 8.089 min

11 SA11P 2 YR POST
Type TRIANGULAR UH Peak flow 2.555 cfs Peak time 5.682 min

[HYDROGRAPH]

1 SA1P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 1.979 cfs Peak time 728.000 min

Unit hydrograph
1 SA1P 2 YR POST

2 SA2P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 1.857 cfs Peak time 728.000 min

Unit hydrograph

[HYDROGRAPH]

3 SA3P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.343 cfs Peak time 728.000 min

Unit hydrograph
3 SA3P 2 YR POST

4 SA4P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.696 cfs Peak time 724.000 min

Unit hydrograph
4 SA4P 2 YR POST

5 SA5P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 1.036 cfs Peak time 728.000 min

Unit hydrograph
5 SA5P 2R POST

6 SA6P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 2.861 cfs Peak time 736.000 min

Unit hydrograph
6 SA6P 2 YR POST

7 SA7P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 4.419 cfs Peak time 736.000 min

Unit hydrograph
7 SA7P 2 YR POST

8 SA8P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.318 cfs Peak time 728.000 min

Unit hydrograph
8 SA8P 2 YR POST

9 SA9P 10 YR FLOOD
Type COMPUTED FLOOD Peak flow 2.583 cfs Peak time 728.000 min

Unit hydrograph
9 SA9P 2YR POST

[HYDROGRAPH]

10 SA10P 10 YR POST
Type COMPUTED FLOOD Peak flow 2.220 cfs Peak time 728.000 min

Unit hydrograph
10 SA10P 2 YR POST

11 SA11P 10 YR POST
Type COMPUTED FLOOD Peak flow 0.926 cfs Peak time 728.000 min

Unit hydrograph
11 SA11P 2 YR POST

12 COMBINED 10 YR POST
Type COMBINE Peak flow 17.138 cfs Peak time 728.000 min

Combined Hydrographs
1 SA1P 10 YR FLOOD
2 SA2P 10 YR FLOOD
3 SA3P 10 YR FLOOD
4 SA4P 10 YR FLOOD
5 SA5P 10 YR FLOOD
6 SA6P 10 YR FLOOD
7 SA7P 10 YR FLOOD
8 SA8P 10 YR FLOOD
9 SA9P 10 YR FLOOD
10 SA10P 10 YR POST

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PROJECT SUMMARY

PROJECT NAME : clark oct

RAINFALL : pocd13

[UNIT HYDROGRAPH]

1 SA1P 2 YR POST
Type TRIANGULAR UH Peak flow 4.815 cfs Peak time 5.466 min

2 SA2P 2 YR POST
Type TRIANGULAR UH Peak flow 4.826 cfs Peak time 5.454 min

3 SA3P 2 YR POST
Type TRIANGULAR UH Peak flow 0.675 cfs Peak time 6.388 min

4 SA4P 2 YR POST
Type TRIANGULAR UH Peak flow 1.691 cfs Peak time 5.366 min

5 SA5P 2R POST
Type TRIANGULAR UH Peak flow 2.848 cfs Peak time 5.418 min

6 SA6P 2 YR POST
Type TRIANGULAR UH Peak flow 3.818 cfs Peak time 14.260 min

7 SA7P 2 YR POST
Type TRIANGULAR UH Peak flow 5.667 cfs Peak time 14.573 min

8 SA8P 2 YR POST
Type TRIANGULAR UH Peak flow 0.930 cfs Peak time 5.368 min

9 SA9P 2YR POST
Type TRIANGULAR UH Peak flow 6.477 cfs Peak time 6.445 min

10 SA10P 2 YR POST
Type TRIANGULAR UH Peak flow 4.151 cfs Peak time 8.089 min

11 SA11P 2 YR POST
Type TRIANGULAR UH Peak flow 2.555 cfs Peak time 5.682 min

[HYDROGRAPH]

1 SA1P 25 YR FLOOD
Type COMPUTED FLOOD Peak flow 2.368 cfs Peak time 728.000 min

Unit hydrograph
1 SA1P 2 YR POST

2 SA2P 25 YR POST
Type COMPUTED FLOOD Peak flow 2.250 cfs Peak time 728.000 min

Unit hydrograph
2 SA2P 2 YR POST

[HYDROGRAPH]

3 SA3P 25 YR POST
Type COMPUTED FLOOD Peak flow 0.407 cfs Peak time 728.000 min

Unit hydrograph
3 SA3P 2 YR POST

4 SA4P 25 YR FLOOD
Type COMPUTED FLOOD Peak flow 0.832 cfs Peak time 724.000 min

Unit hydrograph
4 SA4P 2 YR POST

5 SA5P 25 YR FLOOD
Type COMPUTED FLOOD Peak flow 1.266 cfs Peak time 728.000 min

Unit hydrograph
5 SA5P 2R POST

6 SA6P 25 YR FLOOD
Type COMPUTED FLOOD Peak flow 3.505 cfs Peak time 736.000 min

Unit hydrograph
6 SA6P 2 YR POST

7 SA7P 25 YR POST
Type COMPUTED FLOOD Peak flow 5.391 cfs Peak time 736.000 min

Unit hydrograph
7 SA7P 2 YR POST

8 SA8P 25 YR POST
Type COMPUTED FLOOD Peak flow 0.393 cfs Peak time 728.000 min

Unit hydrograph
8 SA8P 2 YR POST

9 SA9P 25 YR POST
Type COMPUTED FLOOD Peak flow 3.209 cfs Peak time 728.000 min

Unit hydrograph
9 SA9P 2YR POST

[HYDROGRAPH]

10 SA10P 25 YR POST
Type COMPUTED FLOOD Peak flow 2.723 cfs Peak time 728.000 min

Unit hydrograph
10 SA10P 2 YR POST

11 SA11P 25 YR POST
Type COMPUTED FLOOD Peak flow 1.144 cfs Peak time 728.000 min

Unit hydrograph
11 SA11P 2 YR POST

12 COMBINED 25 YR POST
Type COMBINE Peak flow 20.959 cfs Peak time 728.000 min

Combined Hydrographs
1 SA1P 25 YR FLOOD
2 SA2P 25 YR POST
3 SA3P 25 YR POST
4 SA4P 25 YR FLOOD
5 SA5P 25 YR FLOOD
6 SA6P 25 YR FLOOD
7 SA7P 25 YR POST
8 SA8P 25 YR POST
9 SA9P 25 YR POST
10 SA10P 25 YR POST

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UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
TYPE : TRIANGULAR UH
DESCRIPTION : SA1P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	4.81	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	5.47	(min)
Time of Base	=	14.58	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.09	(min)
Basin Lag Time	=	4.92	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.58	(ac)
Curve Number	=	91	

UNIT HYDROGRAPH REPORT

43

RECORD NUMBER : 2
TYPE : TRIANGULAR UH
DESCRIPTION : SA2P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	4.83	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	5.45	(min)
Time of Base	=	14.54	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.09	(min)
Basin Lag Time	=	4.91	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.58	(ac)
Curve Number	=	88	

[TIME CONCENTRATION -- TR-55]

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SHEET FLOW

Manning's Roughness Coef. (n).....	=	0.03500	
Flow Length (L).....	=	55.00	(ft)
2-yr 24-hr Rainfall (R).....	=	3.00	(in)
Land Slope (S).....	=	0.03000	
Travel Time of Sheet Flow.....	=	1.66	(min)

SHALLOW FLOW

K_Coef (surface description) (K).....	=	1.60000	
Watercourse Slope (S).....	=	0.03500	
Velocity (V).....	=	2.99	(ft/s)
Flow Length (L).....	=	157.00	(ft)
Travel Time of Shallow Flow.....	=	0.87	(min)

CHANNEL FLOW

Hydraulic Radius (R).....	=	0.01	(ft)
Channel Slope (S).....	=	0.00500	
Manning's Roughness Coef. (n).....	=	0.00900	
Channel Velocity (V).....	=	0.43	(ft/s)
Flow Length (L).....	=	145.00	(ft)
Travel Time of Shallow Flow.....	=	5.64	(min)

TIME OF CONCENTRATION

Time of Concentration.....	=	8.18	(min)

UNIT HYDROGRAPH REPORT

4<

RECORD NUMBER : 3
TYPE : TRIANGULAR UH
DESCRIPTION : SA3P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	0.67	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	6.39	(min)
Time of Base	=	17.03	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.27	(min)
Basin Lag Time	=	5.75	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.10	(ac)
Curve Number	=	94	

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	44.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.00500	
Travel Time of Sheet Flow	=	9.14	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	2.10000	
Watercourse Slope (S)	=	0.06600	
Velocity (V)	=	5.39	(ft/s)
Flow Length (L)	=	37.00	(ft)
Travel Time of Shallow Flow	=	0.11	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.49	(ft)
Channel Slope (S)	=	0.00500	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	7.28	(ft/s)
Flow Length (L)	=	145.00	(ft)
Travel Time of Shallow Flow	=	0.33	(min)

TIME OF CONCENTRATION

Time of Concentration	=	9.58	(min)

UNIT HYDROGRAPH REPORT

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RECORD NUMBER : 4
TYPE : TRIANGULAR UH
DESCRIPTION : SA4P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	1.69	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	5.37	(min)
Time of Base	=	14.31	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.07	(min)
Basin Lag Time	=	4.83	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.20	(ac)
Curve Number	=	92	

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.01100	
Flow Length (L)	=	50.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.04000	
Travel Time of Sheet Flow	=	0.54	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	2.10000	
Watercourse Slope (S)	=	0.03400	
Velocity (V)	=	3.87	(ft/s)
Flow Length (L)	=	154.00	(ft)
Travel Time of Shallow Flow	=	0.66	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.02	(ft)
Channel Slope (S)	=	0.00700	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	0.88	(ft/s)
Flow Length (L)	=	361.00	(ft)
Travel Time of Shallow Flow	=	6.84	(min)

TIME OF CONCENTRATION

Time of Concentration	=	8.05	(min)

UNIT HYDROGRAPH REPORT

47

RECORD NUMBER : 5
TYPE : TRIANGULAR UH
DESCRIPTION : SA5P 2R POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	2.85	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	5.42	(min)
Time of Base	=	14.45	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.08	(min)
Basin Lag Time	=	4.88	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.34	(ac)
Curve Number	=	86	

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	50.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.06000	
Travel Time of Sheet Flow	=	3.75	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.60000	
Watercourse Slope (S)	=	0.06000	
Velocity (V)	=	3.92	(ft/s)
Flow Length (L)	=	100.00	(ft)
Travel Time of Shallow Flow	=	0.43	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.04	(ft)
Channel Slope (S)	=	0.00500	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	1.37	(ft/s)
Flow Length (L)	=	325.00	(ft)
Travel Time of Shallow Flow	=	3.96	(min)

TIME OF CONCENTRATION

Time of Concentration	=	8.13	(min)

UNIT HYDROGRAPH REPORT

S(

RECORD NUMBER : 6
TYPE : TRIANGULAR UH
DESCRIPTION : SA6P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	3.82	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	14.26	(min)
Time of Base	=	38.03	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	2.84	(min)
Basin Lag Time	=	12.83	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	1.20	(ac)
Curve Number	=	86	

5C

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	237.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.02000	
Travel Time of Sheet Flow	=	20.18	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.40000	
Watercourse Slope (S)	=	0.05200	
Velocity (V)	=	3.19	(ft/s)
Flow Length (L)	=	115.00	(ft)
Travel Time of Shallow Flow	=	0.60	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.25	(ft)
Channel Slope (S)	=	0.03500	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	12.29	(ft/s)
Flow Length (L)	=	449.00	(ft)
Travel Time of Shallow Flow	=	0.61	(min)

TIME OF CONCENTRATION

Time of Concentration	=	21.39	(min)

UNIT HYDROGRAPH REPORT

53

RECORD NUMBER : 7
TYPE : TRIANGULAR UH
DESCRIPTION : SA7P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	5.67	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	14.57	(min)
Time of Base	=	38.86	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	2.91	(min)
Basin Lag Time	=	13.12	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	1.82	(ac)
Curve Number	=	87	

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	245.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.02000	
Travel Time of Sheet Flow	=	20.72	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.65000	
Watercourse Slope (S)	=	0.02000	
Velocity (V)	=	2.33	(ft/s)
Flow Length (L)	=	93.00	(ft)
Travel Time of Shallow Flow	=	0.66	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.50	(ft)
Channel Slope (S)	=	0.02800	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	17.45	(ft/s)
Flow Length (L)	=	493.00	(ft)
Travel Time of Shallow Flow	=	0.47	(min)

TIME OF CONCENTRATION

Time of Concentration	=	21.86	(min)

55

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 8
TYPE : TRIANGULAR UH
DESCRIPTION : SA8P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	0.93 (cfs)
Time Interval	=	4.00 (min)
Time to Peak	=	5.37 (min)
Time of Base	=	14.32 (min)
Rainfall Excess	=	1.00 (in)
Storm Duration	=	1.07 (min)
Basin Lag Time	=	4.83 (min)
Shape Factor	=	484.00

[BASIN DESCRIPTION]

Watershed Area	=	0.11 (ac)
Curve Number	=	84

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	53.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.02000	
Travel Time of Sheet Flow	=	6.09	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	4.50000	
Watercourse Slope (S)	=	0.03500	
Velocity (V)	=	8.42	(ft/s)
Flow Length (L)	=	200.00	(ft)
Travel Time of Shallow Flow	=	0.40	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.02	(ft)
Channel Slope (S)	=	0.03500	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	2.13	(ft/s)
Flow Length (L)	=	200.00	(ft)
Travel Time of Shallow Flow	=	1.57	(min)

TIME OF CONCENTRATION

Time of Concentration	=	8.05	(min)

UNIT HYDROGRAPH REPORT ST

RECORD NUMBER : 9
TYPE : TRIANGULAR UH
DESCRIPTION : SA9P 2YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	6.48	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	6.45	(min)
Time of Base	=	17.19	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.29	(min)
Basin Lag Time	=	5.80	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.92	(ac)
Curve Number	=	83	

58

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	85.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.02000	
Travel Time of Sheet Flow	=	8.89	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.40000	
Watercourse Slope (S)	=	0.05000	
Velocity (V)	=	3.13	(ft/s)
Flow Length (L)	=	147.00	(ft)
Travel Time of Shallow Flow	=	0.78	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.00	(ft)
Channel Slope (S)	=	0.00000	
Manning's Roughness Coef. (n)	=	0.20000	
Channel Velocity (V)	=	0.00	(ft/s)
Flow Length (L)	=	0.00	(ft)
Travel Time of Shallow Flow	=	0.00	(min)

TIME OF CONCENTRATION

Time of Concentration	=	9.67	(min)

[TIME CONCENTRATION -- TR-55]

6

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	112.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.02000	
Travel Time of Sheet Flow	=	11.08	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.40000	
Watercourse Slope (S)	=	0.04000	
Velocity (V)	=	2.80	(ft/s)
Flow Length (L)	=	77.00	(ft)
Travel Time of Shallow Flow	=	0.46	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.25	(ft)
Channel Slope (S)	=	0.03100	
Manning's Roughness Coef. (n)	=	0.00900	
Channel Velocity (V)	=	11.57	(ft/s)
Flow Length (L)	=	413.00	(ft)
Travel Time of Shallow Flow	=	0.60	(min)

TIME OF CONCENTRATION

Time of Concentration	=	12.13	(min)

UNIT HYDROGRAPH REPORT

Q1

RECORD NUMBER : 11
TYPE : TRIANGULAR UH
DESCRIPTION : SA11P 2 YR POST

[UNIT HYDROGRAPH INFORMATION]

Peak Discharge	=	2.56	(cfs)
Time Interval	=	4.00	(min)
Time to Peak	=	5.68	(min)
Time of Base	=	15.15	(min)
Rainfall Excess	=	1.00	(in)
Storm Duration	=	1.13	(min)
Basin Lag Time	=	5.11	(min)
Shape Factor	=	484.00	

[BASIN DESCRIPTION]

Watershed Area	=	0.32	(ac)
Curve Number	=	84	

[TIME CONCENTRATION -- TR-55]

SHEET FLOW

Manning's Roughness Coef. (n)	=	0.15000	
Flow Length (L)	=	104.00	(ft)
2-yr 24-hr Rainfall (R)	=	3.00	(in)
Land Slope (S)	=	0.04000	
Travel Time of Sheet Flow	=	7.91	(min)

SHALLOW FLOW

K_Coef (surface description) (K)	=	1.60000	
Watercourse Slope (S)	=	0.04000	
Velocity (V)	=	3.20	(ft/s)
Flow Length (L)	=	117.00	(ft)
Travel Time of Shallow Flow	=	0.61	(min)

CHANNEL FLOW

Hydraulic Radius (R)	=	0.00	(ft)
Channel Slope (S)	=	0.00000	
Manning's Roughness Coef. (n)	=	0.20000	
Channel Velocity (V)	=	0.00	(ft/s)
Flow Length (L)	=	0.00	(ft)
Travel Time of Shallow Flow	=	0.00	(min)

TIME OF CONCENTRATION

Time of Concentration	=	8.52	(min)

Summary -

Pre Devel Peaks

2yr - 6.64 cfs
10yr - 13.34 cfs
25yr - 16.7 cfs

Post Dev Hyd -

SRH

2yr 9.12 + .47 = 9.59
10yr 17.14 + .93 = 18.07
25yr 20.96 + 1.14 = 22.1 cfs

Hold back enough water to keep a max. flow of 6 cfs @ 25 yr Storm which is max the Capacity of Down Stream 12" City Drain

∴ Qo 2yr = 1.5 - .47 = 1 cfs

Qo - 10yr 4.5 - .93 = 3.57 cfs

Qo - 25yr 6 - 1.14 = 7.86 cfs

2y- Storage

DA = 6.62 Ac
Qo = 1.0 cfs
Inflow = 9.12 cfs
Vol. Runoff = .9 AF / 6.62 = .136' = 1.63 in

10y- Storage

DA = 6.62 Ac
Qo = 3.57 cfs
Inflow = 17.14 cfs
Vol Runoff = 1.72 / 6.62 = .26 x 12 = 3.11 in

25y- DA = 6.62 Ac
Qo = 4.86 cfs
Inflow = 20.96 cfs
Vol Runoff = 2.12 / 6.62 = .32 x 12 = 3.84 in

6.7

********** DETENTION POND FLOOD ROUTING FOR TYPE II & III STORMS **********

LANDOWNER _____ ADDRESS _____

PROJECT 2 yr Storage BY _____ DATE ___/___/___

****************** FLOOD ROUTING RESULTS FOR FINDING VS **********

WATERSHED DRAINAGE AREA		(ACRES)	DA=	6.62
ALLOWED OUTFLOW DISCHARGE		(cfs)	qo=	1
WATERSHED INFLOW DISCHARGE		(cfs)	qi=	9.12
VOLUME OF RUNOFF		(inches)	VR=	1.63
RATIO OF DISCHARGES:	qo/qi		=	.1
RATIO OF VOLUMES:	VS/VR		=	.54
POND STORAGE REQUIRED **********		(inches)	VS=	.88
POND STORAGE REQUIRED		(AC-FT)	VS=	.49

DO YOU WANT ANOTHER FLOOD ROUTING TRIAL ? Y/N?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

********** DETENTION POND FLOOD ROUTING FOR TYPE II & III STORMS **********

LANDOWNER _____ ADDRESS _____

PROJECT 10 yr Storage BY _____ DATE ___/___/___

****************** FLOOD ROUTING RESULTS FOR FINDING VS **********

WATERSHED DRAINAGE AREA		(ACRES)	DA=	6.62
ALLOWED OUTFLOW DISCHARGE		(cfs)	qo=	3.57
WATERSHED INFLOW DISCHARGE		(cfs)	qi=	17.14
VOLUME OF RUNOFF		(inches)	VR=	3.11
RATIO OF DISCHARGES:	qo/qi		=	.2
RATIO OF VOLUMES:	VS/VR		=	.44
POND STORAGE REQUIRED **********		(inches)	VS=	1.39
POND STORAGE REQUIRED		(AC-FT)	VS=	.77

DO YOU WANT ANOTHER FLOOD ROUTING TRIAL ? Y/N?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

********** DETENTION POND FLOOD ROUTING FOR TYPE II & III STORMS **********

LANDOWNER _____ ADDRESS _____

PROJECT 25yr 1 story BY _____ DATE ___/___/___

****************** FLOOD ROUTING RESULTS FOR FINDING VS **********

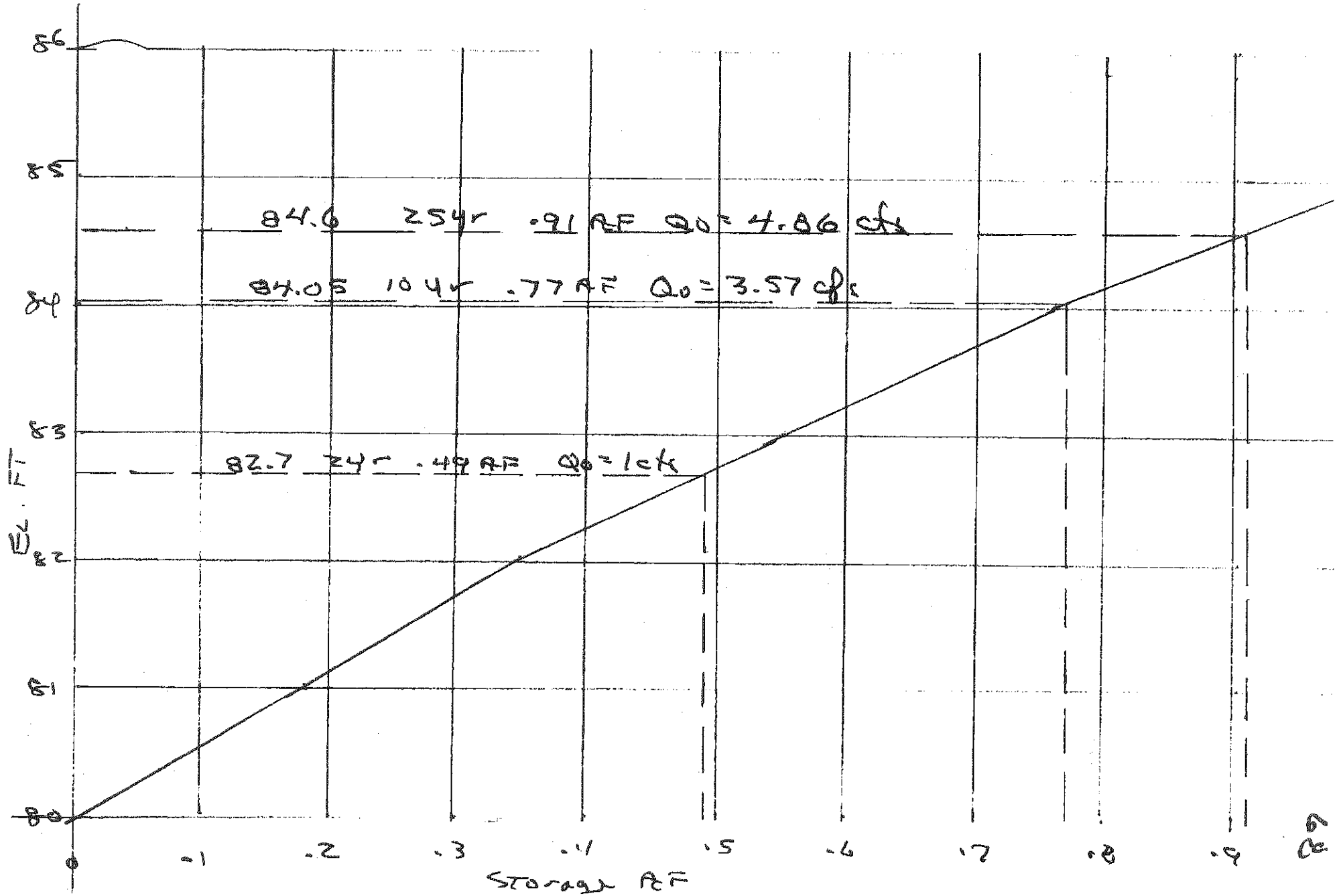
WATERSHED DRAINAGE AREA		(ACRES)	DA= 6.62
ALLOWED OUTFLOW DISCHARGE		(cfs)	qo= 4.86
WATERSHED INFLOW DISCHARGE		(cfs)	qi= 20.96
VOLUME OF RUNOFF		(inches)	VR= 3.84
RATIO OF DISCHARGES:	qo/qi		= .23
RATIO OF VOLUMES:	VS/VR		= .42
POND STORAGE REQUIRED **********		(inches)	VS= 1.64
POND STORAGE REQUIRED		(AC-FT)	VS= .91

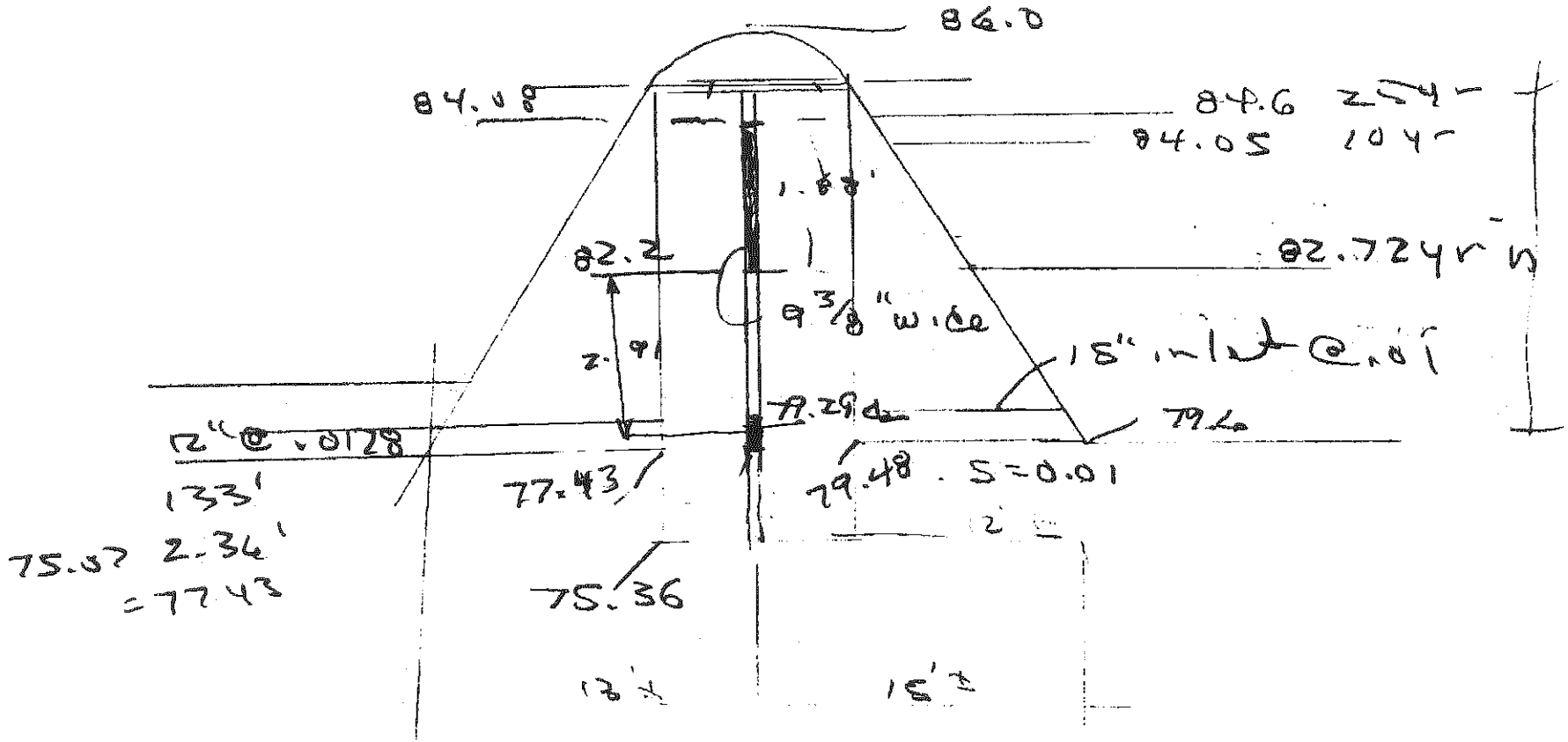
DO YOU WANT ANOTHER FLOOD ROUTING TRIAL ? Y/N?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

Storage Volume of Pond:

EL	Area	Volc.	EV	AF
BO	6316			
		7754	7754	= .18
B1	7191			
		7609	15363	= .35
B2	8027			
		8476	23839	= .55
B3	8925			
		9467	33315	= .76
B4	10008			
		10764	44079	1.01
B5	11520			


86
85
84
83
82
81
80
EL. FT
84.6 25yr .91 RF Qo = 4.86 cfs
84.05 10yr .77 RF Qo = 3.57 cfs
82.7 2yr .49 RF Qo = 1cfs
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
STORAGE RF



head drop 15' - 79.6
- .12
+ 4.6 Hc=
84.08
84.60
.52' HLOSS

Control Structure

6
-0

LANDOWNER _____ ADDRESS _____

PROJECT Pipe SD #9 BY _____ DATE ___/___/___

********** CIRCULAR CULVERT ANALYSIS INPUTS **********

MANNINGS COEFFICIENT PVC=.009 R/C=.013 CMP<=.025 N=? .009
HEADWATER ABOVE INVERT @ ENTRANCE (FT) DE=? 5
TAILWATER ABOVE INVERT @ OUTLET (FT) DO=? 4.6
LENGTH OF CULVERT PIPE (FT) LP=? 12
DROP ALONG CULVERT LENGTH (FT) PD=? .12
CULVERT DIAMETER (FT) D=? 1.25
Low KE=0.20(BELL), High KE=0.80(SHARP)
ENTRANCE LOSS COEFFICIENT KE=? .8

********** CULVERT OUTLET CONTROL (PRESSURE FLOW) EXISTS **********

CULVERT CAPACITY ********** (CFS) Q= 5.11
PIPE VELOCITY (FPS) V= 4.16
ORIFICE CAPACITY (CFS) QO= 11.44 ≥ 4.86 ✓

DO YOU WANT ANOTHER CULVERT DESIGN Y/N ?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

Flow Through an Orfice

2hr Storm

$d = 5 \cdot in$ $h = 2.91 \cdot ft$

Return to Solutions Suite

1. Determine the discharge coefficient.

$C = 0.60$

2. Compute the flow rate.

$$Q = C \cdot \frac{\pi}{4} \cdot d^2 \cdot \sqrt{2 \cdot g \cdot h} \qquad Q = 1.12 \cdot ft^3 \cdot sec^{-1}$$