

Property of  
Flood Control District of MC Library  
Please Return to  
2801 W. Durango  
Phoenix, AZ 85009

Northern/Orangewood  
Storm Drain Project  
Contract FCD 94-12, Phase II  
*Glendale Avenue Storm Drain*  
*Sub-Phase "B"*

*Project Correspondence*

- Incoming Correspondence
- Outgoing Correspondence
- Utility Conflict Correspondence

**ESTIMATE OF QUANTITIES AND COSTS - TRAFFIC CONTROL**

BOLDUC, SMILEY &amp; ASSOCIATES, INC.

PROJECT NO: Glendale Avenue Storm Drain  
Sub-Phase "B"  
96908a

DATE: 07/08/98

Item No.	Item Description	Unit	Quantity	Unit Price	Amount
1	TEMPORARY PAINTED MARKING (ARROW, SYMBOL OR LEGEND)	EACH	6	50.00	300.00
2	TEMPORARY PAINTED MARKING (STRIPE)	L. FT.	11,000	0.20	2,200.00
3	BARRICADE (TYPE II, VERTICAL PANEL, TUBULAR MARKER)	EA.-DAY	26,700	0.65	17,355.00
4	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EA.-DAY	1,300	1.50	1,950.00
5	PORTABLE SIGN STANDS (RIGID)	EA.-DAY	710	1.00	710.00
6	PORTABLE SIGN STANDS (SPRING TYPE)	EA.-DAY	2,180	1.50	3,270.00
7	WARNING LIGHTS (TYPE A)	EA.-DAY	10,180	0.50	5,090.00
8	WARNING LIGHTS (TYPE B)	EA.-DAY	1,150	1.50	1,725.00
9	WARNING LIGHTS (TYPE C)	EA.-DAY	26,700	0.75	20,025.00
10	EMBEDDED SIGN POST	EA.-DAY	16,200	0.05	810.00
11	TEMPORARY SIGN (TYPE II LESS THAN 10 S.F.)	EA.-DAY	1,230	0.90	1,107.00
12	TEMPORARY SIGN (TYPE II GREATER THAN 10 S.F.)	EA.-DAY	11,600	1.00	11,600.00
13	FLASHING ARROW PANEL	EA.-DAY	590	120.00	70,800.00
14	FLAGGING SERVICES (UNIFORMED OFFICER)	HOUR	360	27.00	9,720.00
15					
16		<b>TOTAL - TRAFFIC CONTROL</b>			<b>\$146,662.00</b>
17		<b>USE</b>			<b>\$146,700.00</b>

June 26, 1998

Northern/Orangewood Storm Drain Project Phase II, B  
Glendale Avenue Storm Drain  
W/P # 94153.04

**Response to Comments  
for  
Storm Drain-Irrigation Line Conflict Structure**

The following are Wood/Patel's responses to comments made on the Conflict Structures by Richard Harris, FCDMC, dated June 18, 1998. Please let us know by June 29, 1998 if you have any concerns with these responses so that we may proceed with the 60% design.

Comment # 1

Overall, the suggested design is unfavorable, and alternatives such as siphons or transitions with box culverts under the irrigation lines are considered preferable.

Response # 1

The use of siphons has been discussed and eliminated as an acceptable alternative. SRP would only consider a siphon if the city of Glendale (COG) were to agree to a maintenance agreement. The COG does not wish to engage in such an agreement. Both the COG and the FCDMC were opposed to siphoning the storm drain.

Box structures were looked at as an alternative to the proposed structure. However, due to the limited vertical clearance at all three crossing locations a very shallow, wide and long structure would be required. The following structure size would be required at the three crossing locations:

<u>Location</u>	<u>Irrigation Line</u>	<u>Storm Drain</u>	<u>Box Culvert w/ 4:1 &amp; 2:1 Transitions</u>
13+25.5	36"	96" in/102" out	2-10'x3' Box (23.4'wide x 43.3'long)
26+95.5	24"	96" in/ 96" out	2-10'x3' Box (23.4'wide x 43.8'long)
54+40.0	36"	90" in/ 90" out	2-8'x3' Box (18.9'wide x 32.8'long)

The width of these structures would also conflict with the existing 15" sanitary sewer in Glendale Avenue. For this reason, the box type structure was eliminated from further consideration.

Comment # 2

If the current design is to be selected, the following should be included:

A) Structure dimensions and shape should be such that there will be a 4:1 or longer expansion possible for flows which will enter the structure, before reaching the upstream edge of the Irrigation line sleeve. In addition, the dimensions and shape of the structure downstream of the irrigation line should be such that a 2:1 or longer contraction is possible for flows between the downstream edge of the irrigation line sleeve and the pipe entrance. The clear area under the irrigation line should either be the area of full flow for an equivalent diameter pipe, or the area of the currently proposed pipe, whichever is greater.

Response # 2A

Will comply.

Comment to Response #2A

Agreed

B) Given the suggested dimensions in number 2, above, the increased potential for utility conflicts by building the structures should be checked.

Response # 2B

Will comply.

Comment to Response #2B

Agreed

(C) The cast iron pipe sleeve should be coated with some type of rust inhibitor.

Response #2C

Will Comply.

Comment to Response #2C

Agreed

D) Unless documentation is provided to substantiate a lower value, the loss coefficient, "K", used in the hydraulic model for these structures should have a value of at least 0.8.

Response # 2D

With the use of transitions from comment # 2A and an equivalent flow area between the bottom of the irrigation pipe sleeve and the invert of the box, we would recommend using a loss coefficient of 0.4. This will create a loss through the structures of approximately 0.5'. A coefficient of 0.8 in our opinion is very high. It would cause a loss through the structures of approximately 1' which is comparable to a 90° bend which we feel is excessive.

Comment to Response # 2D

The reasoning behind the suggested loss coefficient of 0.8 is based upon recognizing that conceptually, the pipe and box structure combination is hydraulically similar to having a short open channel in-between two bridges. The expected flow transition conditions will be from pressure flow to open channel flow (entering the box structure), and returning back to pressure flow from open channel flow (entering the pipe from the box structure). In order to support the equivalent-area concept for modeling flow under the irrigation line, these conditions seem reasonable. The loss coefficient value of 0.8 was therefore derived as a result of combining the loss coefficients for bridge flow exit expansion (0.5) and flow entrance expansion (0.3), suggested for use in the USACOE HEC-2 and HECRAS backwater flow models. Thus, I will continue to recommend applying the loss coefficient value of 0.8 for this application.

E) The structure should include an access hole to allow for proper maintenance.

Response # 2E

Will Comply.

cc: RW Shobe-FCDMC  
Mike Lopez- FCDMC  
Richard Harris-FCDMC  
Grant Anderson-City of Glendale  
Dan Sherwood-City of Glendale  
Burton Charron-City of Peoria

June 26, 1998

Northern/Orangewood Storm Drain Project Phase II,C  
Orangewood Avenue Storm Drain  
W/P # 94153.06

**Response to Review Comments  
for  
East Basin Design Concept Analysis**

The Following are Wood/Patel's responses to comments made on the East Basin Design Concept Analysis by Richard Harris, FCDMC, dated June 18, 1998. Please let us know by June 29, 1998 if you have any concerns with these responses so that we may proceed with the 30% design.

Comment #1

In the description of Alternate C on page 4, please explain why item number 1 under "Cons" is considered bad.

Response #1

This should be moved from "Cons" Item #1 into "Pros" Item #5.

Comment #2

Per the project IGA, the unit cost of excavation should be increased to \$4.00 per cubic yard, and the overall cost estimate revised accordingly.

Response #2

The costs for the IGA were developed by RW Shobe based on his negotiations with ADOT. We have discussed the cost for this item with RW and he feels the number we are currently using for cost estimating, \$3/cy, is sufficient. However, at his direction we will use whatever number the FCDMC agrees upon.

Comment to Response #2

I was informed by R.W. Shobe that the value used in the IGA was \$4.00/cy, before I made my comment above. Please check with him on this.

Comment #3

Since both storage basins for the project will be in-line, a project HEC-1 should be included in the 30% submittal to verify that the stage-storage-discharge analysis has been appropriately modeled. The 30% plans should include information which verifies model inputs. Examples of typical verification methods include elevation contours within or cross-sections through the basins.

Response #3

A HEC-1 model will be included in the 30% submittal for Phase II,C. An area/volume relationship table will also be included for each basin. At this level of design, the basins are assumed to be square or rectangular with 5:1 side slopes and a 0.5% grade in the basin bottom. Subsequent to the 30% submittal, the city of Glendale parks department will be involved in terracing the basins as multi-use facilities. When this is completed, cross sections or contours will be generated to verify volumes.

Comment #4

While some drainage and storage features now proposed will differ from the previous 30% submittal, many of the comments already made regarding that submittal may still apply. A copy of them is attached for your reference.

Response #4

Will comply.

cc:RW Shobe-FCDMC  
Mike Lopez-FCDMC  
Richard Harris-FCDMC  
Grant Anderson-City of Glendale  
Dan Sherwood-City of Glendale  
Burton Charron-City of Peoria

RECEIVED

JUN 25 1998

*Letter of Transmittal*

De Leuw, Cather \* Hoffman-Miller Engineers, Inc.

WOOD, PATEL &  
ASSOCIATES

Fairmount Square  
3875 North 44th Street, Suite 250  
Phoenix, Arizona 85018-5435  
Telephone: (602) 852-9195  
Fax: (602) 952-9303

Date: June 26, 1998

To: James Taillon

Company: Wood - Patel

Location: 1550 East Missouri  
Suite 203  
Phoenix, Arizona 85014

Telephone No.: 602 234-1344

Fax No.:

From: Lee W. Dickson

Subject: GLENDALE AVENUE

Project No. : 101 L

Message:

THE ATTACHED SKETCHES SHOW EXISTING AND PROPOSED UTILITY LOCATIONS FOR GLENDALE AVENUE AT THE AGUA FRIA FREEWAY.

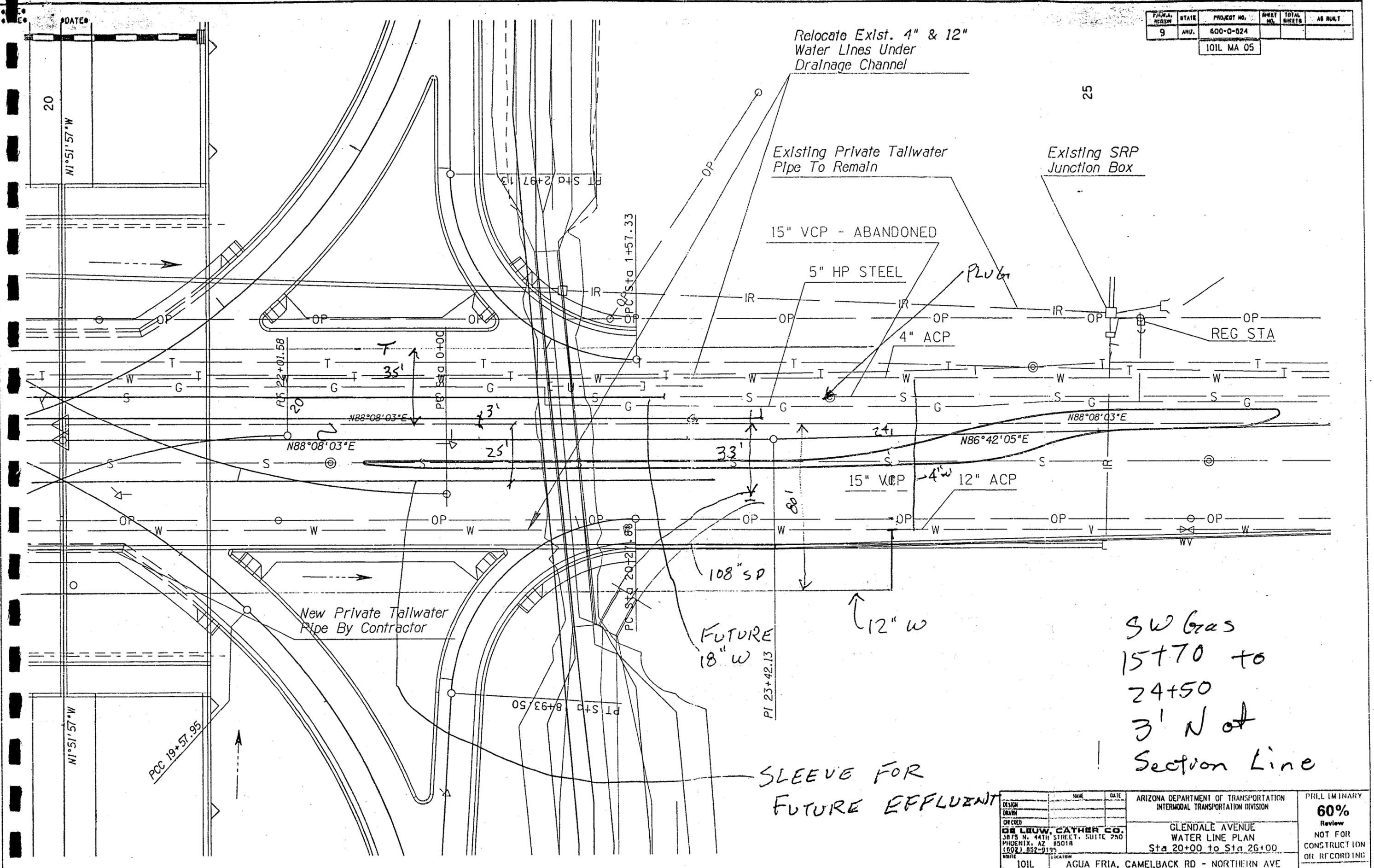
THE 24" FUTURE EFFLUENT LINE IS PROPOSED TO BE LOCATED 25 FEET SOUTH OF THE SECTION LINE. THE SLEEVE WILL EXTEND TO OUTSIDE OF THE LIMITS OF PCCP, AND ANOTHER 50 TO 60 FEET OF SPACE IS DESIRED FOR A JACKING PIT.

IF THERE ARE CONFLICTS WITH OTHER FACILITIES THAT PREVENT MOVING THE STORM DRAIN TO 37', IT COULD MOVE BACK TO 33' AFTER IT IS EAST OF ABOUT STATION 24+50.

CC: DAN SHERWOOD, CITY OF GLENDALE

Note: If you have received this communication in error, please notify us immediately by telephone.

FED. HIGHWAY DISTRICT	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	AZ	600-0-024			
101L MA 05					

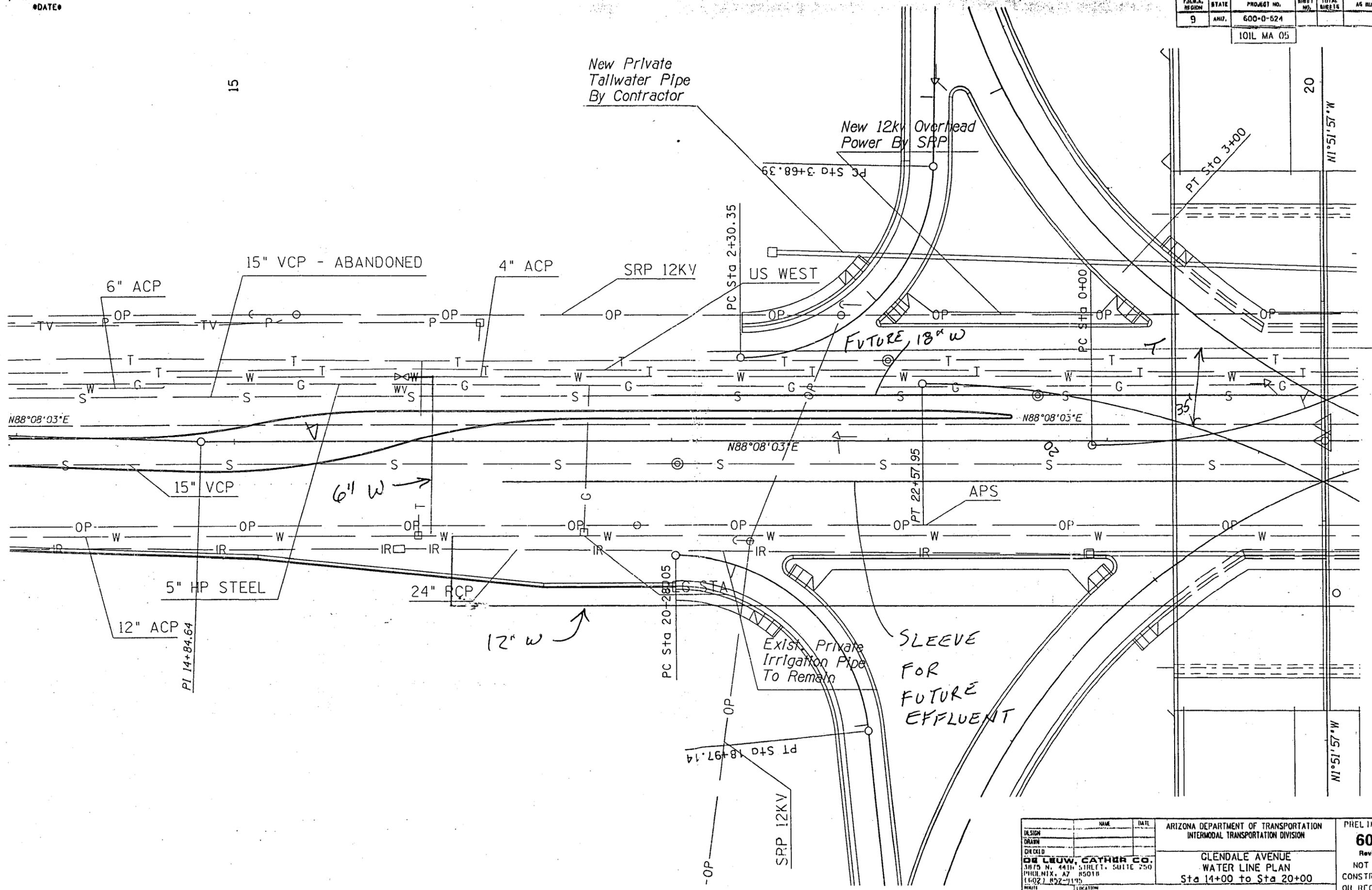


DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	PRELIMINARY <b>60%</b> Review NOT FOR CONSTRUCTION OR RECORDING
DRAWN				
CHK CRED			GLENDALE AVENUE WATER LINE PLAN Sta 20+00 to Sta 26+00	
OR LOW, CAYHER CO. 3075 N. 44TH STREET, SUITE 250 PHOENIX, AZ 85018 (602) 852-9195				
NO. 101L	LOCATION		AGUA FRIA, CAMELBACK RD - NORTHERN AVE	

DATE

FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-624			

101L MA 05



DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	PRELIMINARY <b>60%</b> Review NOT FOR CONSTRUCTION OR RECORDING
DRAWN				
CHECKED			GLENDALE AVENUE WATER LINE PLAN Sta 14+00 to Sta 20+00	
BY LEW, CATHRIN CO. 3075 N. 44th STREET, SUITE 250 PHOENIX, AZ 85018 (602) 822-1133				
101L	AGUA FRIA, CAMELBACK RD - NORTHERN AVE			

**From:** Jaeger, Darrell  
**Sent:** Thursday, June 18, 1998 4:35 PM  
**To:** McCarty, Joel; Taillon, James  
**Subject:** FW: Northern/Orangewood Phase II B

-----Original Message-----

**From:** R. W. Shobe - FCDX [SMTP:rws@mail.maricopa.gov]  
**Sent:** Thursday, June 18, 1998 4:21 PM  
**To:** 'woodpatl'  
**Subject:** RE: Northern/Orangewood Phase II B

I thought I had notified you that you were to proceed with the potholing using your sub I have note to that effect. As for the railroad Olin is working on it and it should go out this week. Thanks for the follow-up.

> -----Original Message-----

> From: woodpatl [SMTP:woodpatl@netzone.com]  
> Sent: Thursday, June 18, 1998 10:10 AM  
> To: RW Shobe @ FCDMC  
> Subject: Northern/Orangewood Phase II B  
>  
> RW,  
> I just wanted to touch bases with you on a couple of outstanding  
> issues. I  
> wanted to verify that the application for pipe crossing at the  
> railroad has  
> been submitted and that the additional potholes for irrigation line  
> crossings have been ordered. If you require additional information or  
> assistance from Wood/Patel to address these items please let me know.  
>  
> Thank You

**From:** Jaeger, Darrell  
**Sent:** Thursday, June 18, 1998 4:36 PM  
**To:** Taillon, James  
**Subject:** FW: Storm Drain-Irrigation Line Conflict Structure

-----Original Message-----

**From:** Richard Harris - FCDX [SMTP:rph@mail.maricopa.gov]  
**Sent:** Thursday, June 18, 1998 2:32 PM  
**To:** 'woodpatl@netzone.com'  
**Cc:** R. W. Shobe - FCDX; Michael Lopez - FCDX  
**Subject:** Storm Drain-Irrigation Line Conflict Structure

I have reviewed a sketch of the proposed structure as depicted on the FAX sent to the District by James Taillon of your firm, dated June 15th, 1998. I offer the following comments:

1) Overall, the suggested design is unfavorable, and alternatives such as siphons or transitions with box culverts under the irrigation lines are considered preferable.

2) If the current design is to be selected, the following should be included:

A) Structure dimensions and shape should be such that there will be a 4:1 or longer expansion possible for flows which will enter the structure, before reaching the upstream edge of the Irrigation line sleeve. In addition, the dimensions and shape of the structure downstream of the irrigation line should be such that a 2:1 or longer contraction is possible for flows between the downstream edge of the irrigation line sleeve and the pipe entrance. The clear area under the irrigation line should either be the area of full flow for an equivalent diameter pipe, or the area of the currently proposed pipe, whichever is greater.

B) Given the suggested dimensions in number 2, above, the increased potential for utility conflicts by building the structures should be checked.

C) The cast iron pipe sleeve should be coated with some type of rust inhibitor.

D) Unless documentation is provided to substantiate a lower value, the loss coefficient, "K", used in the hydraulic model for these structures should have a value of at least 0.8.

E) The structure should include an access hole to allow for proper maintenance.

**From:** Jaeger, Darrell  
**Sent:** Wednesday, June 17, 1998 2:02 PM  
**To:** Taillon, James  
**Subject:** FW: Northern/orangewood storm drain junction box

-----Original Message-----

**From:** Bob Maurer [SMTP:btmaurer@srp.gov]  
**Sent:** Wednesday, June 17, 1998 1:41 PM  
**To:** wood patel and associates  
**Subject:** Northern/orangewood storm drain junction box

James Taillon;

We will be happy to have our structural engineers review your design as soon as you submit more then conceptual.Keep in mind that SRP has not fully approved this concept and we won't unless our structural engineers will approve the supporting method through the box versus the pressures exerted by the volume of water carried through the storm sewer,etc. Your earliest submittal would be beneficial to all concerned parties. Thanks

RECEIVED

MAY 20 1998

# Salt River Project

Salt River Project  
1521 N. Project Drive  
Tempe, AZ 85281-1213

WOOD, PATEL &  
ASSOCIATES



Mailing Address:  
P.O. Box 52025  
Phoenix, AZ  
85072-2025

FAX: (602) 236 - 2737

## LETTER OF TRANSMITTAL

To:

COMPANY	WOOD PATEL & ASSOC.	DATE	5-18-98
1550 E. Missouri Ave. STE #203			
PHX AZ - 85014-2400			
ATTENTION: JAMES TALLON			

From:

NAME	ROBERT MAUREL	PHONE	236-2962
------	---------------	-------	----------

Reference:

SUBJECT	UTILITY CONFLICT MANHOLE Northern/Orangewood	LOG/FILE NO.	
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Transmitted for:

<input type="checkbox"/> APPROVAL	<input type="checkbox"/> RETURNED FOR CORRECTIONS
<input type="checkbox"/> YOUR INFO & USE	<input type="checkbox"/> RESUBMIT _____ COPIES FOR APPROVAL
<input type="checkbox"/> AS REQUESTED	<input type="checkbox"/> SUBMIT _____ COPIES FOR DISTRIBUTION
<input type="checkbox"/> REVIEW AND COMMENT	<input type="checkbox"/> APPROVED
<input type="checkbox"/> REQUESTED INFORMATION RECORD DRAWINGS	<input checked="" type="checkbox"/> OTHER

Remarks:

CALL ME —
THURS — BSN

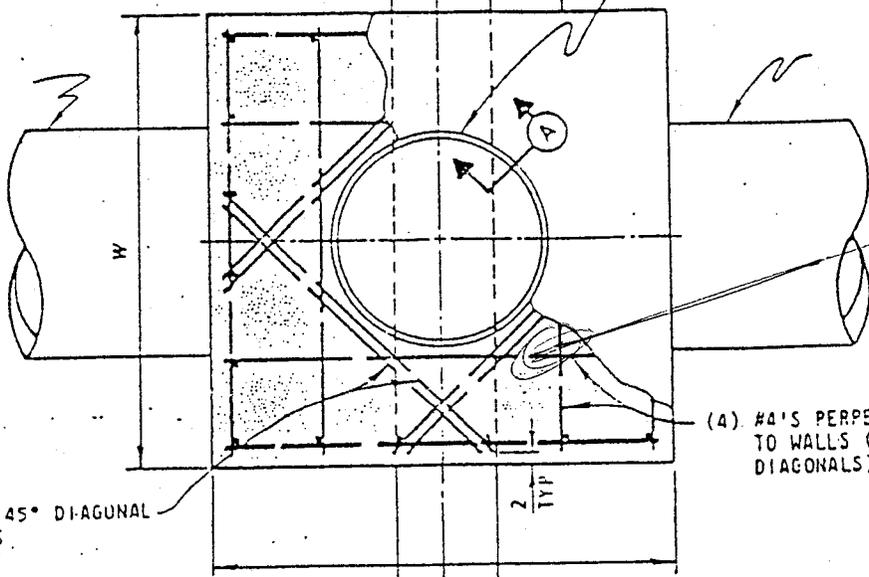




MINIMUM ONE STANDARD LENGTH OF CAST IRON SEWER PIPE CAST INTO MANHOLE WALLS.

24" MINIMUM PROJECTION TO FIRST JOINT (TYP)

STANDARD 24" CAST IRON FRAME & COVER - CAT. NO. 04-0425 FOR AVAILABILITY CONTACT SRP MATERIAL RECLAMATION DIVISION PHONE 273-5900



OLD MANHOLE DRAWING (see new STANDARD DRAWING)

(6) #4'S AT 45° DIAGONAL TO WALLS.

(4) #4'S PERPENDICULAR TO WALLS (RESTING ON DIAGONALS)

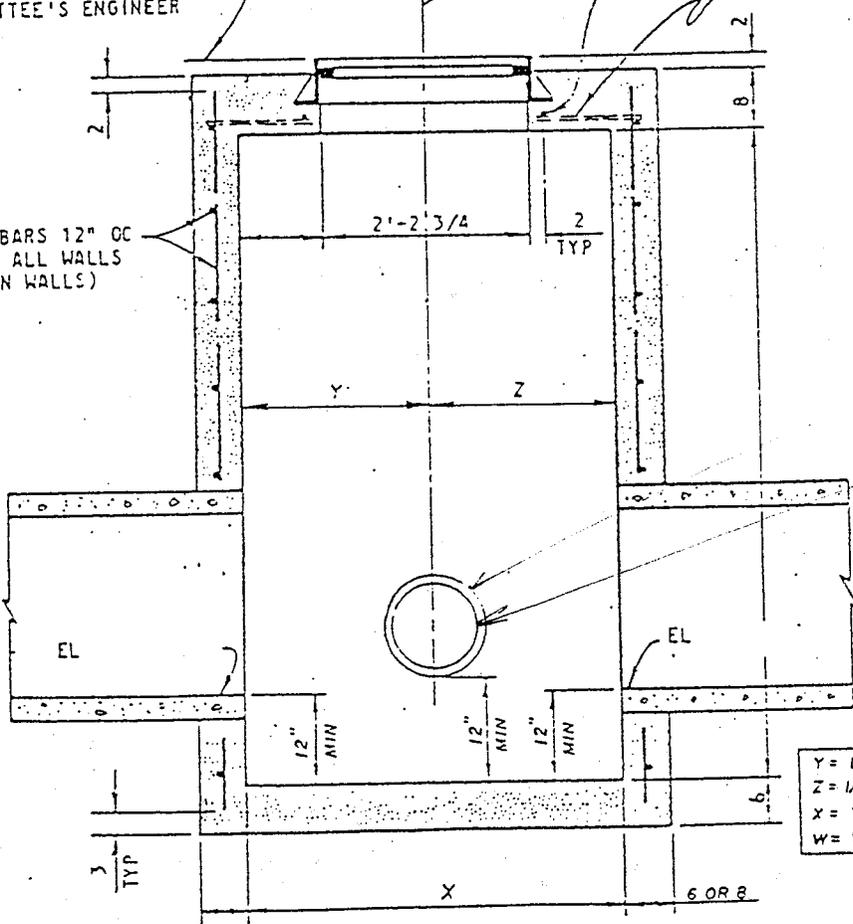
EL. (+) ROAD SURFACE EXACT ELEVATION TO BE SET BY PERMITTEE'S ENGINEER

UTILITY

#4'S PERPENDICULAR TO WALLS

#4'S DIAGONAL TO WALLS

#4 REINF BARS 12" OC BOTH WAYS ALL WALLS (CENTER IN WALLS)



C.I. SLEEVE - DUCTILE IRON (IRRY PIPE)

Y = 1/2 (ID UTIL. + ID DOWNSTREAM PIPE)  
Z = 1/2 (ID UTIL. + ID UPSTREAM PIPE)  
X = Y + Z = EVEN INCH  
W = WIDTH REQUIRED

GRAVITY FLOW UTILITY CONFLICT MANHOLE

Taillon, James

**From:** Castaneda, Jeff  
**Sent:** Monday, May 18, 1998 7:40 AM  
**To:** Taillon, James  
**Subject:** E-MAIL

Meeting Time & Location: 8 - 9 am at Wood/Patel office (1550 E Missouri; phone: 234 1344)  
Attendees: Ashok Patel Wood/Patel  
James Taillon Wood/Patel  
Dave Schaub BRW  
Nasir Raza BRW

Issues

1. 108" Storm Drain Plans at Glendale Ave/Agua Fria Frwy

Description: Wood/Patel provided plan-profile drawings for the 108" storm drain within Glendale Ave at the Agua Fria Frwy. The plans show the storm drain 30 feet south of and parallel to the Section line (ADOT 30% plans show the offset to be 20 feet). The selected tie-in point to the ADOT system matches the point shown on ADOT's 30% Agua Fria Frwy plans.

Action: BRW will provide De Leuw Cather with the new location of the storm drain for coordination with the underground utilities.

2. Horizontal & Vertical Control at Glendale Ave/Agua Fria Frwy

Description: Wood/Patel provided drawings with vertical & horizontal control; Vertical datum difference (ADOT datum vs. Glendale datum) between ADOT & Wood/Patel plans is less than 1/2 inch. Horizontal control is the section line; ADOT plans for Glendale Ave reference the section line but the construction reference line is offset to the south to accommodate the existing Glendale Road north curb. Action: Wood/Patel to fax vertical datum difference to BRW

3. 108" Storm Drain Outfall at Glendale Ave/Agua Fria Frwy

Description: BRW intends to provide a curved pipe at the outfall. Manhole and angle point shown on the ADOT 30% plans are to be eliminated. ADOT policy is to not have manholes within the concrete pavement of the interchange. BRW will evaluate proposed tie-in point for compatibility with a curved pipe outfall.

Action: BRW will provide 108" storm drain outfall design and an appropriate tie-in point to Wood/Patel; Wood/Patel will provide electronic file for 108" storm drain plans to BRW.

4. Design Flows at Glendale Ave/Agua Fria Frwy

Description: Wood/Patel provided a breakdown of flows. The 108" storm drain outfall brings a 10 yr frequency flow of 500 cfs. The N-S Agua Fria Frwy channel conveys a 100 yr peak flow of 435 cfs upstream of Glendale Ave and 1250 cfs downstream of Glendale Ave. An overland inflow of 300 cfs was shown at the northeast corner of the N-S channel/Glendale Ave intersection. A deeper concrete turndown along the east edge of the concrete channel was suggested by Wood/Patel for overland flows into the N-S channel. It was suggested that the design flows for the N-S channel are conservative.

Action: Wood/Patel suggested that BRW may require a more detailed analysis for overland flows.

5. Design and Construction Schedule

Description: Agua Fria Frwy 60% plans are due on July 17, 1998. 108" storm drain plans by Wood/Patel for FCD are due in 1 1/2 months approx. Agua Fria Frwy is likely to be open to traffic in the year 2000.

Note:

In a subsequent conversation with R. W. Shobe (FCDMC) the following schedule for the 108" storm drain was provided:

60% plans by mid June, 1998

90% plans by mid July, 1998

Final plans by end of August, 1998

Begin construction in November, 1998

# Geotrack, Inc.

11219 N. 23rd Avenue  
Phoenix, Arizona 85029  
(602) 331-3225

To: JAMES TAILLIN Date: 5-1-98  
 Company: WOOD/PATEL Time: 2:00  
 Dept: \_\_\_\_\_ From: CHRISTINE PRICE  
 Fax No: 234-1322 Number of Pages: 2

(including cover)

~ ~ ~ ~ ~

- For Your Records       Per Your Request       Return for Corrections
- For Your Use       For Your Approval       For Review & Comment
- Reply Necessary       Hard Copy by mail      Date Needed: \_\_\_\_\_

~ ~ ~ ~ ~

Message: IF YOU HAVE ANY QUESTIONS - PLEASE  
CALL. BE AWARE THAT P.H. #24 IS  
GAS NOT TELEPHONE.

~ ~ ~ ~ ~

If there are questions or malfunctions with this transmission, please call:

**(602) 331-3225**

**NORTHERN/ORANGEWOOD STORM DRAIN PROJECT**  
 Glendale Avenue Storm Drain - Agua Fria Freeway to 83rd Avenue  
 Phase II, Sub-Phase B  
 Flood Control District of Maricopa County

April 3, 1998

Contract FCD 94-12  
 PHASE II  
 Sub-phase "B"  
 W/P # 94153.04

Pothole Request South Side Storm Drain Alignment

Glendale Avenue				
Pothole Number	Location	Mainline Station (a)	Offset from ML (b)	Utility (c)
1	87th Ave Lateral	13+16	8' Lt	5" Gas
2	87th Ave Lateral	13+16	34' Lt	Telephone
3	85th Ave Lateral	26+36	17' Lt	5" Gas
4 RLC WB	95th Ave Lateral	26+36	30' Lt	Telephone
5	Mainline	47+04	29' Rt	Telephone
6	Mainline	50+31	29' Rt	Telephone
7	Mainline	52+58	29' Rt	4" Gas
8	91st Ave Lateral	52+80	17' Lt	5" Gas
9	91st Ave Lateral	52+80	30' Lt	Telephone
10	Mainline	53+03	29' Rt	Tele & 2" Water
11	Mainline	54+49	29' Rt	Telephone
12 RLC EB	Mainline	85+64	21' Rt	Telephone
13	89th Ave Lateral	85+06	17' Lt	5" Gas
14	89th Ave Lateral	66+06	30' Lt	Telephone
15 RLC EB	Mainline	78+47	21' Rt	4" Gas
16	87th Ave Lateral	79+35	17' Lt	5" Gas
17	87th Ave Lateral	79+35	30' Lt	Telephone
18	87th Ave Lateral	79+35	45' Lt	Gas
19 RLC EB	Mainline	87+23	21' Rt	Telephone
20 LRL WB	85th Ave Lateral	92+57	17' Lt	5" Gas
21	95th Ave Lateral	92+57	30' Lt	Telephone
22	85th Ave Lateral	92+57	41' Lt	Gas
23 RLC EB	Mainline	93+07	21' Rt	Telephone
24	Mainline	96+14	21' Rt	Telephone <i>CAF</i>
25 INT	83rd Ave Lateral	105+80	17' Lt	5" Gas
26 03	83rd Ave Lateral	105+80	30' Lt	Telephone

Note: (a) Station 0+00.00 at the Monument line intersection of 85th Ave and Glendale Ave.  
 (b) Offsets are from the Monument line of Glendale Avenue.  
 (c) Based on input from the FCDMC only "Dry Utilities" have been identified for potholing.



Transportation Engineering Consultants

Stephen L. Bolduc, P.E.  
Terry N. Smiley, P.E.

# fax

Project #: 96908

Date: April 27, 1998

Time: \_\_\_\_\_

To: Mr. James Taillon

Fax Number: 234-1322

Wood, Patel & Associates, Inc.

From: Terry Smiley

Re: Northern/Orangewood Storm Drain

Construction Zone Traffic Control

Number of Sheets (including FAX cover sheet): 2

A hard copy of this Transmittal will be mailed to you. Yes  No

If you have received this communication in error, please immediately notify us by telephone. Thank you.

96908F01.WPD

5080 NORTH 40TH STREET, SUITE 250 • PHOENIX, ARIZONA 85018 • (FAX 952-1134) • (602) 952-1577



**Northern/Orangewood Storm Drain  
Glendale Avenue - Sub-Phase 'B'  
Construction Zone Traffic Control**

Traffic Control

During the construction of this section of storm drain, 2-way traffic will be carried on the north side of Glendale Avenue in a single traffic lane in each direction.

Two-way traffic will be created by placing vertical panels or tubular markers on the existing lane line. Westbound traffic will be carried in the northernmost lane while eastbound traffic will be carried across one of the median openings and maintained in the lane adjacent to the median island. The contractor will be limited to shifting eastbound traffic onto the north half of the roadway only in those areas where storm drain construction is occurring on the south side of the roadway. The length of the traffic control zone where 2-way traffic is carried on the north half of the roadway will be limited to a maximum length of 1/4 mile.

While working in the 91st Avenue intersection, the contractor shall maintain eastbound and westbound traffic on the north half of Glendale Avenue. Left turns will be prohibited. North-south traffic on 91st Avenue will also have to be restricted to a single lane in each direction and left turns will need to be prohibited. A uniformed, off-duty police officer will be required to manually operate the traffic signal while construction activities are occurring in the intersection.

The same types of traffic control will be utilized at the Glendale Avenue and 83rd Avenue intersection. Two-way traffic will be maintained on the north side of Glendale and the east side of 83rd Avenue. A uniformed, off-duty police officer will be required to manually operate the traffic signal. Left turns will need to be prohibited on all approaches to the intersection. The contractor will be required to minimize the amount of time that he will be working in this intersection. The contractor will not be allowed to work in both the 91st Avenue and 83rd Avenue intersections at the same time.

Access to the properties along the south side of Glendale will need to be maintained by the contractor, providing this access through the work areas. Where access is being maintained, No Left Turn signing will be required. Upon completion of the major storm drain system, it will be necessary for the contractor to shift 2-way traffic to the south half of Glendale Avenue in those areas where storm drain laterals are being provided across the westbound lanes.

96908TC1.WPD

**Bolduc, Smiley & Associates, Inc.**

RECEIVED

APR 28 1998

WOOD, PATEL & ASSOCIATES

Transportation Engineering Consultants

Stephen L. Bolduc, P.E.  
Terry N. Smiley, P.E.

**fax**

Project #: 96908

Date: April 27, 1998

Time: 9:00 am

To: Mr. James Taillon /

Fax Number: 234-1322

Wood, Patel & Associates, Inc.

From: Terry Smiley

Re: Northern/Orangewood Storm Drain

Construction Zone Traffic Control

Number of Sheets (including FAX cover sheet): 2

A hard copy of this Transmittal will be mailed to you. Yes X No       

If you have received this communication in error, please immediately notify us by telephone. Thank you.

96908F01.WPD

5080 NORTH 40TH STREET, SUITE 250 • PHOENIX, ARIZONA 85018 • (FAX 952-1134) • (602) 952-1577

RECEIVED

APR 28 1998

WOOD BATHY A  
ASSOCIATES

**B**olduc,  
**S**milley &  
**A**ssociates, Inc.

**Northern/Orangewood Storm Drain  
Glendale Avenue - Sub-Phase 'B'  
Construction Zone Traffic Control**

During the construction of this section of storm drain, 2-way traffic will be carried on the north side of Glendale Avenue in a single traffic lane in each direction.

Two-way traffic will be created by placing vertical panels or tubular markers on the existing lane line. Westbound traffic will be carried in the northernmost lane while eastbound traffic will be carried across one of the median openings and maintained in the lane adjacent to the median island. The contractor will be limited to shifting eastbound traffic onto the north half of the roadway only in those areas where storm drain construction is occurring on the south side of the roadway. The length of the traffic control zone where 2-way traffic is carried on the north half of the roadway will be limited to a maximum length of 1/4 mile.

While working in the 91st Avenue intersection, the contractor shall maintain eastbound and westbound traffic on the north half of Glendale Avenue. Left turns will be prohibited. North-south traffic on 91st Avenue will also have to be restricted to a single lane in each direction and left turns will need to be prohibited. A uniformed, off-duty police officer will be required to manually operate the traffic signal while construction activities are occurring in the intersection.

The same types of traffic control will be utilized at the Glendale Avenue and 83rd Avenue intersection. Two-way traffic will be maintained on the north side of Glendale and the east side of 83rd Avenue. A uniformed, off-duty police officer will be required to manually operate the traffic signal. Left turns will need to be prohibited on all approaches to the intersection. The contractor will be required to minimize the amount of time that he will be working in this intersection. The contractor will not be allowed to work in both the 91st Avenue and 83rd Avenue intersections at the same time.

Access to the properties along the south side of Glendale will need to be maintained by the contractor, providing this access through the work areas. Where access is being maintained, No Left Turn signing will be required. Upon completion of the major storm drain system, it will be necessary for the contractor to shift 2-way traffic to the south half of Glendale Avenue in those areas where storm drain laterals are being provided across the westbound lanes.

96908TC1.WPD



# CATELLUS

RECEIVED

APR 24 1998

WOOD, PATEL &  
ASSOCIATES

April 22, 1998

Scott Rasmusun  
1550 E. Missouri  
Suite 203  
Phoenix, Arizona 85014

Dear Mr. Rasmusun:

Enclosed please find a 66" storm drain pipeline crossing permit application per your request. Please fill out completely and return along with two (2) copies of proposed work plans. Complete location description, including Railroad mile post, is imperative in order to process in a timely manner.

This letter is not a binding agreement but merely our understanding of the terms and conditions to be discussed in connection with the proposed transaction. The terms of the agreement and any rights or obligations will be as set forth in the final written contract, if any, if and when it is executed by you and approved and executed by The Burlington Northern And Santa Fe Railway Company (or its Attorney In Fact, Catellus Management Corporation).

If you have any questions, please call me at (972) 719-6162.

Sincerely,

Patricia Foster  
Contract Specialist

Enclosure

Date: \_\_\_\_\_

APPLICATION FOR PIPE LINE CROSSING OR LONGITUDINAL

Permit Services  
Catellus Management Corporation  
4545 Fuller Drive, Suite 105  
Irving, TX 75038

APPLICANT'S TAX I.D. NO./SS# \_\_\_\_\_

ATTN: Patricia Foster

We submit for your approval the following specifications for a pipe line we propose to build across THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY right-of-way, as shown on enclosed sketch.

Legal name of company or municipality who will own the pipeline \_\_\_\_\_

State in which incorporated \_\_\_\_\_

If not incorporated, correct name of owners or all partners: \_\_\_\_\_

Correct mailing address \_\_\_\_\_ Zip Code \_\_\_\_\_

Type of Encroachment: Crossing \_\_\_\_\_ Longitudinal \_\_\_\_\_ Telephone \_\_\_\_\_

Location of encroachment \_\_\_\_\_ 1/4 Sec \_\_\_\_\_ Twsp \_\_\_\_\_ Rng \_\_\_\_\_ MP \_\_\_\_\_ + \_\_\_\_\_

Name of nearest town on Railroad \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_

Name of nearest roadway crossing Railroad \_\_\_\_\_

Within limits of public road or street  Yes  No If yes, distance from center line of road or street \_\_\_\_\_ ft.

	CARRIER	CASING
Contents to be handled through pipe	_____	_____
Length of pipe on Railroad Co. property	_____	_____
(Plastic pipe must be encased full width of right of way)	_____ ft.	_____ ft.
Inside diameter of pipe	_____ in.	_____ in.
Pipe Material	_____	_____
Specification & grade (Min. yield strength casing 35,000 psi.)	_____	_____
Wall Thickness	_____	_____
(Min. wall thickness of casing pipe under 14 in.-0.188 in. E-80 Loading)	_____ in.	_____ in.
Actual working pressure	_____ psi	_____
Type of joint - (mechanical or welded type)	_____	_____
Longitudinal Joint Factor	_____	_____
Coating	_____	_____
Distance Base of rail to top of pipe	_____	_____
(Flammable, contents, steam, water or non-flammable - min. 5 1/2 ft. under main track.)	_____	_____
(Uncased, gaseous products - min. 10' under track)	_____	_____
Minimum ground cover on Railroad Co. property (min. 3 ft.)	_____	_____
Cathodic protection casing-(flammable substance)	_____	_____
Type of insulators or supports	_____ Size _____ Space _____	_____
Number of vents	_____ Size _____ Height above ground _____	_____
(Flammable substances require 2 vents)	_____	_____
Method of crossing: Jacking _____ Trench _____ Dry Bore Only _____	_____	_____
(If trenched - Railroad furnish flagman at applicant's expense.)	_____	_____
(If bored or jacked - Jacking Pit location minimum 30 ft. from centerline of nearest track.) Pit must not be open more than 48 hours.	_____	_____
Also, it must be protected when not in use.	_____	_____
Does pipeline support oil or gas well? <input type="checkbox"/> Yes <input type="checkbox"/> No	_____	_____
If yes, advise distance the well is from Railway property - _____ ft. Name of well _____	_____	_____

Attached to this sheet is location plan and detail sketch. Sketch shows tie-down measurement to centerline of nearest road crossing, bridge or other railroad structure. Please authorize us to proceed with this installation or advise what changes are necessary to meet your specifications.

Signed: \_\_\_\_\_  
Title: \_\_\_\_\_  
Telephone: \_\_\_\_\_

## PART 3 - UTILITIES CROSSING RAILROAD PROPERTY

### A. General Provisions

This section of the policy applies to all public and private utilities, including electric power, telephone (including fiber optics), telegraph, cable television, water, gas, oil, petroleum products, steam, chemicals, sewage, drainage, irrigation and similar lines that are located, adjusted or relocated within property under the jurisdiction of BNSF. Such utilities may involve underground, surface or overhead facilities.

Installations crossing the property of the railroad, to the extent feasible and practicable, are to be perpendicular to the railroad alignment and preferably at not less than forty-five (45) degrees to the centerline of the track. Utilities shall not be placed within culverts or under railroad bridges, buildings or other important structures.

Utilities will be located so as to provide a safe environment and shall conform to the current "National Electrical Safety Code", "American Waterworks Association Specifications", "Federal Pipeline Safety Regulations" and "The American Railway Engineering Association Specifications". Where laws or orders of public authority prescribe a higher degree of protection, then the higher degree of protection prescribed shall supersede the provisions of this manual.

### B. Overhead Installations

1. When aerial crossings are required, all poles, guys, anchors and appurtenances shall be located preferably outside of railroad property. Exceptions may be permitted with the approval of BNSF.
2. Complete spanning of the property is encouraged with supportive structures and appurtenances located outside of the property. For electric supply lines, normally the crossing span shall not exceed 150 feet with adjacent span not exceeding 1-1/2 times the crossing span length. For communication lines, the crossing span shall not exceed 100 feet in heavy loading district, 125 feet in medium loading district and 150 feet in light loading district, and adjacent span shall not exceed 1-1/2 times the crossing span length. For heavier type construction longer spans will be considered.
3. Joint-use construction is encouraged at locations where more than one utility or type of facility is involved (Electricity and petroleum shall not be combined).
4. To ensure that overhead wire crossings are clear from contact with any equipment passing under such wires, communication lines shall be constructed with a minimum clearance above top of rail of twenty-four (24) feet and electric lines with a minimum clearance of twenty-six and one-half (26 1/2) feet or greater when required by the "National Electrical Safety Code" or state and local regulations. It is desirable that no overhead wire crossings be built within three hundred (300) feet of any railroad bridge. Where such construction is necessary, sixty (60) feet overhead clearance above top of rail is required. Electric lines must have florescent ball marker on low wire over center line of track.

5. All overhead flammable and hazard material lines will need Chief Engineer approval (and should be avoided if at all possible).

## C. Underground Installations

### 1. General

All underground utility crossings of railroad trackage shall be designed to carry Cooper's E-80 Railroad live loading with diesel impact (AREA Coppers loading Section 8-2-8). This 80,000 lb. axle load may be distributed laterally a distance of three (3) feet, plus a distance equal to the depth from structure grade line to base of rail, on each side of center line of single tracks, or center lines of outer tracks where multiple tracks are to be crossed. In no case shall railroad loading design extend less than ten (10) feet laterally from centerline of track. Longitudinally, the load may be distributed between the five (5) foot axle spacing of the Cooper configuration. Railroad loading criteria will also apply where future tracks on BNSF are contemplated, to the extent this information is available.

All utility crossings under ditches and railroad trackage should have a minimum depth of cover of three (3) feet below the flow line of the ditch or ground surface and five and one-half (5-1/2) feet from base of rail. In fill sections, the natural ground line at the toe of slope will be considered as ditch grade. The depth of cover shall not be less than that meeting applicable industry standards.

The use of plastic (PVC) carrier pipe for sewer, water, natural gas and other liquids is acceptable under specific circumstances. The use of plastic pipe is satisfactory if the pipe is designed to meet all applicable Federal and State codes, and if the carrier pipe is properly encased within a steel casing pipe per AREA Standards. This casing should extend the full width of Right of Way. Casing may be omitted only for gaseous products if carrier pipe is steel and is placed ten (10) feet minimum below base of rail per AREA Standards.

### 2. General Design and Construction Requirements

- a. If the minimum depth is not attainable because of existing utilities, water table, ordinances or similar reasons, the line shall be rerouted.
- b. Locations which are considered unsuitable or undesirable are to be avoided. These include deep cuts and in wet or rocky terrain or where it will be difficult to obtain minimum depth.
- c. Underground installations may be made by open trenching from the property line to the toe of the fill slope in fill sections and to the toe of the shoulder slope in cut sections but to no closer than thirty (30) feet of the track. The remainder will be tunneled, augured or dry bored through the roadbed. Refer to the following sections for required encasement of utilities and boring requirements.
- d. Manholes should be located outside railroad property. Manholes shall not be located in the shoulder, shoulder slope, ditch or backslope or within twenty-five (25) feet of railroad trackage and shall not protrude above the surrounding ground without approval of BNSF.

- e. Utilities will not be permitted to be attached to or routed through drainage structures or cattle passes. Utilities are not to be attached to other railroad structures without the written approval of BNSF.

### 3. Pipeline Requirements

- a. Pipeline designs are to specify the type and class of material, maximum working pressures and test and design pressure. Pipelines which are not constructed, operated and maintained under regulations established under US Department of Transportation Hazardous Materials Regulations Board, shall upon revision in the class of material or an increase in the maximum operating pressure, must obtain BNSF Engineering approval.
- b. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall conform to the requirements of the current AREA, ANSI/ASME B 31.4 Code for pressure piping - Liquid Petroleum Transportation Piping Systems; ANSI B 31.8 Code for pressure piping - gas transmission and distribution piping systems; other applicable ANSI codes and 49 C.F.R., Part 195 - "Transportation of Hazardous Liquids by Pipeline", except that the maximum allowable stress of design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by longitudinal joint factor) of the pipe as defined in the ANSI Codes.
  - c) Pipelines under railroad tracks and across railroad property shall be encased in large pipe or conduit called casings. Casings shall extend from right-of-way to right-of-way unless otherwise approved.
- 1) Casings may be omitted for gaseous products only under the following circumstances:
  - a) Carrier pipe wall thickness' must conform to E-80 loading for casing pipe shown in the tables as included in the AREA manual Chapter 1, Part 5 for Pipeline Crossings. The length of thicker-walled pipe shall extend from railroad right-of-way line to right-of-way line. This will generally result in thicker wall pipe on railroad right-of-way.
  - b) All metallic pipe shall be coated and cathodically protected.
  - c) The depth from base of rail to top of pipe shall not be less than 10 feet below base rail. The depth from ditches or other low points on railroad right-of-way shall not be less than six (6) feet from ground line to top of pipe.
  - d) Jacking pits shall be located a minimum of thirty (30) feet from the centerline of track.
- 2) In circumstances where it is not feasible to install encasement from right-of way to right-of-way, casing pipe under railroad tracks and across railroad

property shall extend to the greater of the following distances, measured at right angles to centerline of track:

- a) Two (2) feet beyond toe of slope.
  - b) Three (3) feet beyond ditch line.
  - c) Twenty-five (25) feet (minimum) each side of centerline of outside track when casing is sealed at both ends.
  - d) Forty-five (45) feet (minimum) each side of centerline of outside track when casing is open at both ends.
- d. Pipelines and casing pipe shall be suitably insulated from underground conduits carrying electric wires on railroad property.

#### 4. Encasement of Utilities

- a. Casings are oversized load bearing conduits or ducts through which a utility is inserted:
  - 1) To protect the railroad from damages and to provide for repair, removal and replacement of the utility without interference to railway traffic.
  - 2) To protect the carrier pipe from external loads or shock, either during or after construction.
  - 3) To convey leaking fluids or gases away from the area directly beneath the railroad trackage to a point of venting at the railroad property line.
- b. Casing pipe and joints shall be of metal or concrete and of leakproof construction. Casings shall be capable of withstanding the railroad loadings and other loads superimposed upon them.
- c. Wall thickness designation for steel casing pipe for E-80 Loading (including impact) are:

Nominal Diameter, Inches	Minimum Thickness, for Coated Pipe, Inches	Non Coated, Inches
14 and Under	.188	.188
16	.219	.281
18	.250	.312
20 and 22	.281	.344
.24	.312	.375
26	.344	.406
28	.375	.438
30	.406	.469

<u>Nominal Diameter, Inches</u>	<u>Minimum Thickness, for Coated Pipe, Inches</u>	<u>Non Coated, Inches</u>
32	.438	.500
34 and 36	.469	.531
38, 40, and 42	.500	.563
44 and 46	.531	.594
48	.563	.625
50	.594	.656
52	.625	.688
54	.656	.719
56 and 58	.688	.750
60	.719	.781
62	.750	.813
64	.718	.844
66 and 68	.813	.875
70	.844	.906
72	.875	.938

- 1) Steel pipe shall have a minimum yield strength of 35,000 pounds per square inch.
  - 2) All metallic casing pipes are to be designed for effective corrosion control for a period of 100 years. Corrosion control measures must include cathodic protection.
  - 3) Cast iron may be used for casing. It shall conform to ANSI A21. The pipe shall be connected with mechanical type joints. Plain-end pipe shall be connected with compression type couplings. The strength of the cast iron pipe to sustain external loads shall be computed in accordance with the most current ANSI A21.1 "Manual for the Computation of Strength and Thickness of Cast Iron Pipe".
  - 4) The casing pipe may be reinforced concrete pipe conforming to the AREA Specifications for Reinforced Concrete Culvert Pipe (AREA Manual, Part 10, Chapter 1, Part 4).
- d. The inside diameter of the casing pipe shall be such that the carrier pipe can be removed without disturbing the casing. All joints or couplings, supports, insulators or centering devices for the carrier pipe shall be considered in the selection of the casing diameter.
- e. For flexible casing pipe, a minimum vertical deflection clearance of the casing pipe shall be three percent (3%) of its diameter plus one-half (1/2) inch so that no loads from the roadbed, track, railroad traffic or casing pipe are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the relationship of the casing size to the size of the carrier pipe are:

Diameter of Carrier Pipe

Inside Diameter of Casing Pipe Equals  
Outside Diameter of Carrier Pipe Plus

0"-8"	2"
10"-16"	3-1/4"
over 16"	4-1/2"

5. Casing and Pipeline Installation

- a. Casing and pipeline installations should be accomplished to dry boring, tunneling, jacking or other approved methods. Jacking or tunneling construction methods under tracks will be permitted only under direct supervision of a BNSF Engineer. Tunneling procedures and equipment, as well as structural design, must have BNSF Bridge Department approval prior to starting any work on BNSF property. Generally, jacking or tunneling shall not be considered where less than six (6) feet of cover exists or where excessively sandy, loose or rocky soils are anticipated.

Rail elevations over the work must be monitored at intervals prescribed by BNSF to detect any track movement. Movements of over one-quarter (1/4) inch vertically shall be immediately reported to the BNSF Roadmaster. Due to the danger to rail traffic that is caused by only small amounts of track movement, BNSF forces may have to be called to surface the track several times.

The following requirements shall apply to these construction methods:

- 1) The use of water under pressure jetting or puddling will not be permitted to facilitate boring, pushing or jacking operations. Some boring may require water to lubricate cutter and pipe, and under such conditions, is considered dry boring.
- 2) Where unstable soil conditions exist, boring or tunneling operations shall be conducted in such a manner as not to be detrimental to the railroad being crossed.
- 3) If excessive voids or too large a bored hole is produced during casing or pipeline installations, or if it is necessary to abandon a bored or tunneled hole, prompt remedial action should be taken by the Utility Owner.
- 4) All voids or abandoned holes caused by boring or jacking are to be filled by pressure grouting. The grout material should be a sand cement slurry with a minimum of two (2) sacks of cement per cubic yard and a minimum of water to assure satisfactory placement.
- 5) The hole diameter resulting from bored or tunneled installations shall not exceed the outside diameter of the utility pipe, cable or casing (including coating) by more than one and one-half (1-1/2) inches for pipes with an inside diameter of twelve (12) inches or less, or, two (2) inches on pipes with an inside diameter greater than twelve (12) inches.

- 6) Pits for boring, tunneling or jacking should not be permitted within thirty (30) feet of the track, or closer to the track than the toe of fill slopes in fill sections or toe of shoulder slopes in ditch sections when pipes are allowed on the railroad property.
- b. In casing pipe installations where ends of casing are below ground, they shall be suitably sealed to outside of carrier pipe. When ends of casing are at or above ground surface, and are above high water level, they may be left open provided drainage is afforded in such manner that leakage will be conducted away from railroad tracks or structures. Where proper drainage is not provided, the ends of the casing shall be sealed.
  - c. Vents. In casing pipe installations, vents are appurtenances by which fluids between carrier and casing may be inspected, sampled, exhausted or evacuated.
    - 1) Vents shall be located at the high end of short casings and at both ends of casing longer than one hundred fifty (150) feet.
    - 2) Vent standpipes shall be located and constructed so as not to interfere with maintenance of the railroad nor to be concealed by vegetation. Where possible, they shall be marked and located at the property line. The markers shall give the name and address of the owner and a phone number to contact in case of emergency.
    - 3) Casing pipe, when sealed, shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter and shall be attached near each end of casing projecting through ground surface at property lines.
    - 4) Vent pipes shall extend not less than four (4) feet above ground surface. Top of vent pipes shall be fitted with a down-turned elbow, properly screened or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected.
    - 5) Vent pipes shall be at least four (4) feet vertically from aerial electric lines.
  - d. Shut-Off Valves
    - 1) Accessible emergency shut-off valves shall be installed within effective distances on each side of the railroad by the Utility Owner. Where pipelines are provided with automatic control stations, no additional valves shall be required.
    - 2) Locating a shut-off valve on railroad property should be avoided. If approval is acquired, the shut-off valve must be protected by a guard rail.

- 3) When a guard rail is required, its height shall be four (4) feet above the ground line. All four corner posts shall be driven to a minimum depth of four (4) feet below ground line. There shall be a minimum clearance of two (2) feet from the valve to the guard rail. The steel pipes for the four corner posts and guard rail shall have a minimum diameter of four (4) inches. All joints will be welded with a one-quarter (1/4) inch fillet weld all around.

#### 6. Water Lines

- a. Where casing pipe is used, venting is not required; however, sealing will be required if the ends of the casing are not above high water.
- b. Where non-metallic pipe is permitted and installed, steel casings are required from Right of Way line to Right of Way line.
- c. Manholes should be located outside the railroad property. Manholes shall not be located within twenty-five (25) feet of railroad trackage, in the shoulder, shoulder slope, ditch or backslope, and shall not protrude above the surrounding ground without the approval of BNSF Engineering.
- d. The Utility Owner shall place a readily identifiable and suitable marker at each railroad property line where it is crossed by a water line.

#### 7. Sewer Lines

- a. New and relocated sewer lines shall be constructed with satisfactory joints, materials and designs which will provide protection and resistance to damage from sulfide gases and other corrosive elements to which they may be exposed.
- b. Where casing pipe is used, venting and sealing of casing will be required.
- c. Where non-metallic pipe is permitted and installed, a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.
- d. Manholes should be located outside the railroad property. Manholes shall not be located with twenty-five (25) feet of railroad trackage, in the shoulder, shoulder slope, ditch or backslope, and shall not protrude above the surrounding ground without the approval of BNSF.

#### 8. Electric Power Lines

- a. When underground installation of electric power lines is proposed within the property of the railroad (not under railroad tracks), they shall be covered to depths as required by the National Electric Safety Code. The voltage and related depth of bury is shown by the following:

<u>Voltage</u>	<u>Minimum depth of bury</u>
22,000 or less	*36 inches
22,001 - 40,000	> 36 inches
40,001 and greater	42 inches

Note: Amendments to the code may require greater depths.

\* Required by this policy.

- b. Markers which identify the Utility Owner shall be placed at both property lines for utilities crossing the railroad property.
  - c. Above ground utility appurtenances installed as a part of an underground installation shall be located at or near the railroad property line and shall not be any closer than twenty-five (25) feet to centerline track.
9. Fiber Optics
- a. No rail plow will be allowed for installation purposes.
  - b. Whenever feasible, all cable should be laid 5 feet from property lines.
  - c. Any specialized equipment used to install cable must be approved by the BNSF Engineering Department.



# Quote

## Haestad Methods

37 Brookside Road  
Waterbury, CT 06708-9968  
USA

Phone: (203) 755-1666 Fax: (203) 755-7961

<b>To:</b> <b>Rick Hiner</b> <b>Wood Patel &amp; Associates</b> <b>1550 E Missouri Ave, Suite 203</b> <b>Phoenix, AZ 85014</b> <b>USA</b> Phone: 602 234 1344 Fax: 602 234 1322	<b>Notes:</b> Rick,  Here is the price quote you requested. If I can be of any further assistance, please don't hesitate to call me at 1-800-727-6655, or e-mail to khug@haestad.com.  Thanks, Kevin
--	---

Act. Mngr: Kevin Hughes	Quote Date: 4/1/98	Customer ID: 73750
Quote ID: 1212	Expiration Date: 5/1/98	Account ID: 140868010

Product Name	Qty	Unit Price	Disc Price	Line Total
StormCAD 1.0 to 1.5 Upgrade	1	\$195.00	\$95.00	\$95.00

\* Upgrade Maricopa County Flood Control's StormCAD unlimited inlets version 1.0 to 1.5.

Gross Total	\$195.00
Discounted Dollars	\$100.00
Discounted Subtotal	\$95.00
Freight Charge	\$0.00
Sales Tax	\$0.00
Quote Total	\$95.00

All prices are in US Dollars

Attn: Richard Harris  
 Fax: 506-4601  
 from: Ash Patel 4/1/98

800 727 6555 | www.haestad.com | www.civilprojects.com

Wednesday, April 01, 1998

Page 1 of 1

Faxed @ 4:15 PM  
3/2/98



# Quote

## Haestad Methods

37 Brookside Road  
 Waterbury, CT 06708-9968  
 USA

Phone: (203) 755-1666 Fax: (203) 755-7961

<p>To:  <b>Rick Hiner</b>  <b>Wood Patel &amp; Associates</b>  <b>1550 E Missouri Ave, Suite 203</b>  <b>Phoenix, AZ 85014</b>  <b>USA</b>                  Phone: 602 234 1344                  Fax: 602 234 1322</p>	<p>Notes:                  Rick,                  Here is the price quote you requested. If I can be of any further assistance, please don't hesitate to call me at 1-800-727-6655, or e-mail to khug@haestad.com.                  Thanks, Kevin</p>
--	---

Act. Mngr: <b>Kevin Hughes</b>	Quote Date: <b>4/1/98</b>	Customer ID: <b>73750</b>
Quote ID: <b>1212</b>	Expiration Date: <b>5/1/98</b>	Account ID: <b>140868010</b>

Product Name	Qty	Unit Price	Disc Price	Line Total
<b>StormCAD 1.0 to 1.5 Upgrade</b>	<b>1</b>	<b>\$195.00</b>	<b>\$95.00</b>	<b>\$95.00</b>

\* Upgrade Maricopa County Flood Control's StormCAD unlimited inlets version 1.0 to 1.5.

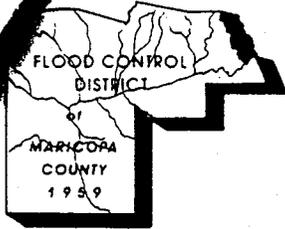
Gross Total	<b>\$195.00</b>
Discounted Dollars	<b>\$100.00</b>
Discounted Subtotal	<b>\$95.00</b>
Freight Charge	<b>\$0.00</b>
Sales Tax	<b>\$0.00</b>
Quote Total	<b>\$95.00</b>

All prices are in US Dollars

800 727 6555 | [www.haestad.com](http://www.haestad.com) | [www.civilprojects.com](http://www.civilprojects.com)

Wednesday, April 01, 1998

Page 1 of 1



**FLOOD CONTROL DISTRICT**  
of  
**Maricopa County**

2801 West Durango Street • Phoenix, Arizona 85009-6399  
Telephone (602) 506-1501  
Fax (602) 506-4601  
TT (602) 506-5859

BOARD OF DIRECTORS  
Betsey Bayless  
Jan Brewer  
Fulton Brock  
Don Stapley  
Mary Rose Garrido Wilcox

March 30, 1998

Mr. Grant Anderson, P.E.  
City Engineer  
City of Glendale  
5850 West Glendale Avenue  
Glendale, Arizona 85301

**Subject: Northern/Orangewood Storm Drain Phase II, Sub-Phase B: Glendale Avenue Storm Drain Realignment**

Dear Mr. Anderson:

The District has received a copy of the "Minutes of Meeting" dated March 9, 1998 for a meeting between Glendale and Wood/Patel concerning a realignment for the Glendale Storm Drain. The minute's state that Glendale would prefer to have the storm drain constructed further south of the monument line in the east bound lane. The District has evaluated this alignment and two others as they relate to the proposed alignment (4' south of the monument line). The alignment Glendale is proposing now is equal in construction costs only if Glendale relocates the existing 15" sewer line between 89<sup>th</sup> and 83<sup>rd</sup> Avenues at their cost and authorizes pavement replacement with 4" AC on 12" ABC instead of in kind which is 8" AC on 9" ABC. The sewer line must be relocated in advance of the construction of the storm drain to avoid a negative impact.

Also, I understand that Glendale is proposing to overlay this segment of Glendale Avenue within the next year. It may be bad public relations to follow the overlay work within the next year by excavating a road that the public perceives as new pavement. I propose that the District advance the construction of the storm drain to the fall of 1998 and that Glendale delays the overlay until after the completion of the storm drain.

I realize the scheduling of these three projects: sewer line relocation, paving overlay, and storm drain construction is going to be difficult but if we work closely together this can be minimal.

on, Grant  
Engineer  
City of Glendale  
Subject: Northern/Orangewood Storm Drain Phase II

As timing is important and the design schedule for the storm drain is being impacted by Glendale's request to change the alignment, please sign in the space provided below if you concur with the above proposal and return the original to me in the enclosed self-addressed envelope. A copy has been provided for your records.

If you have any questions, please call me at 506-4603.

Sincerely,



R. W. Shobe, P. E.  
Project Manager

Enclosure

Copy to: Burton Sheron, City of Peoria  
Wood/Patel and Associates

---

I \_\_\_\_\_, City Engineer of Glendale, concur with the proposal above and direct the District to proceed with the design. Glendale will make arrangements for the relocation of the sewer line and arrange for the delay in the paving overlay.



**FLOOD CONTROL DISTRICT**  
*of*  
**Maricopa County**

**Interoffice Memorandum**

**DATE:** March 9, 1998  
**TO:** RWS  
**VIA:** MAL  
**FROM:** RPH  
**SUBJECT:** Glendale Storm Drain Pre-submittal Spreadsheet  
Comments

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I have reviewed the subject materials, and offer the following comments:

- 1) Beginning tailwater conditions need to be substantiated for the hydraulic analysis. Please provide technical documentation regarding the future outfall condition at the AFF Channel. Also, all steps used to determine the HGL at each location need to be fully documented. One easily understood and acceptable form of documentation is a flow chart.
- 2) I am not familiar with the middle portion of the equation for Normal flow depth,  $h$  in column BX. Values for normal depth calculated by using the Haestad Methods Flowmaster program were less at every location. Please provide a reference for the spreadsheet equation.
- 3) Given conditions where flow depths are less than 0.8 times the pipe diameter, the appropriate hydraulic radius, velocity, and flow area should be derived from Hydraulic Element relationships such as is found on Figure 6-5 in Chow's Open Channel Hydraulics, and figure 4.10 from AISI's Modern Sewer Design. Saati (1990) provided a direct solution for depth and velocity for the partial flow situation if discharge, slope and roughness are known (page 290, Municipal Storm Water Management, Debo and Reese). Form losses should be based upon flow velocity thus derived.
- 4) The determination of HGL in the spreadsheet should be revised

File Folder: IO-MEM79

to include the following:

A. Beginning at the outlet and continuing upstream for a distance to be determined based on a ponded condition, the pipe is submerged for a certain length. This length should be applied to the first iteration to calculate the frictional headloss for that segment since it is a known submerged length. Losses based upon a full flow condition should be added to the Hf and depth to determine the beginning TW for the next segment.

B. This process should continue upstream until it is found that the combination of flow depth and headlosses is less than 80% of the pipe diameter, after which point the full flow condition, including velocity determination, will no longer apply.

C. To maximize efficiency and minimize costs, pipe diameter at this point should be reduced just enough to create full flow, while not compromising criteria regarding differences between the gutter and HGL elevations.

5) As result of applying the preliminary basic feature elevation and flow design data from the spreadsheet to the Haestad Methods Stormcad software, it was found that the pipe material and related costs could be reduced around 10% by reducing pipe sizes, while still maintaining the spreadsheet calculated difference between the HGL and the ground elevation at most locations. The resulting pipe sizes and locations are as follows:

<u>Pipe ID</u>	<u>Diameter</u>
41A	108
41B	96
41C	96
41D	96
42A	96
42B	96
43A	84 20
43B	85 34
43C	90 34
43D	84 32
44A	72
44B	72
4	66
5A	60
5B	54
6A	54
6B	42
7	42

Additional savings may be realized by reducing sizes of other pipes not listed above.

- 6) It appears that the calculation for column BZ does not allow for partial flow conditions to exist between 0.5 and 0.8 times pipe full conditions. Please explain. Also, the calculation picks the largest value between BX and BY, which does not seem cost efficient in light of my own analysis (see comment #3, above). Please rectify.
- 7) For all future surge basin designs, an HEC-1 submittal will be required at the 30% design submittal to verify features used in the spreadsheet. The HE-1 should include stage-storage-discharge records for the basin locations.
- 8) The calculation of "K" in column A is missing the denominator value equal to 2.21 (see the Hydraulics Manual equation 4.4).
- 9) Please explain the basis of the "sheet suggested" diameter calculation.
- 10) The values shown for coefficients in the spreadsheet column entitled "loss due to lateral flow" should be substantiated or the losses recalculated by applying the junction loss equation 4.9a from the Drainage Design Manual of Maricopa County, Volume II.
- 11) Per the Drainage Design Manual of Maricopa County, the recommended manhole loss coefficient value is 0.05 per manhole for simple flow through conditions (no change in pipe size or Q). Please revise the spreadsheet accordingly.

FORM DRAIN HYDRAULIC GRADE LINE COMPUTATION WORKSHEET

Project: Northern/Orangewood Storm Drain Phase II B Glendale Ave - City of Glendale  
 Engineer: JGT File Name: q:\northernPh2\30\plans\glen30pr.xls 1/29/98  
 Description: Computation of HGL & EGL for storm drain system  
 Reference: Drainage Design Manual for Maricopa County, Arizona Volume II, Hydraulics, January 1996  
 Last Revised: January 1998

Notes:

- This spreadsheet is developed to compute storm drain hydraulic grade line based on the above mentioned reference. All Equations used and minor loss coefficients shall be referred to this reference.
- The blue areas are user input blocks. The white areas are computed values.
- The recommended flow type for storm drain systems by the reference is pressure flow. Therefore, open channel flow computation is only an approximation here. The hydraulic grade line at the outfall is assumed to be the invert elevation plus the pipe diameter. If the tailwater elevation is different from this value, the user should change this number manually.
- The station is located at the immediate downstream of a change point.
- If the number of rows of the spreadsheet is not enough for a project, the user can copy more rows to the bottom of the spreadsheet.
- This spreadsheet calculates suggested pipe diameters with increment of 150 mm (6 inches). User can select different values than the suggested.
- Manning's n values can be selected from Table 4.1.
- The Transition Loss Column (Kt) is the summation of Kt values for each section, and the individual Kt values are from Tables 4.2 to 4.4 based on the transition types: a) gradual enlargement, b) sudden enlargement, c) contraction, the D2/D1 ratio, the velocity in, and other related information on these tables.
- The Bend Loss Column is the summation of Kb values for each section including manhole losses, Bend Losses and Lateral Flow Losses. The individual bend Kb values are from Figure 4.7.
- A column is provided for minor losses other than the types considered in the spreadsheet. The user should input these values directly.
- If users find any error or have any suggestion, please contact Wood/Patel & Associates.

Glendale Avenue - AFF Outfall Channel to 83rd Avenue Preliminary Sent to Richard Harris of the FCDMC on 1/29/98

Storm Sewer Line Station Location	Pipe #	Pipe Length (ft)	Pipe Diameter		n	Natural Ground Elevation (ft)	Invert Elev. (ft)	Transition Loss Coeff. Sum(Kt)	Bend Loss Coefficient				Junction Losses			D2/D1	Vel. (ft/s)	Full Area (ft²)	V²/2g (ft)	K	Sf (ft/ft)	Losses					Total Losses (ft)	Hydraulic Grade Line Elevation (ft)	Energy Grade Line Elevation (ft)	Pressure Flow Check	"Overflow" Check	Comments	Depth to Hydraulic Grade Line (ft)	Depth to Invert (ft)		
			Sheet Suggested (in)	User Selected (in)					Loss Due to Bend	Loss Due to Lat Flow	Number of MH	Loss Due to Manholes	Total Bend Loss Coeff. Sum(Kb)	Q3 (cfs)	D3 (in)							Theta (deg)	hf (ft)	ht (ft)	hb (ft)	hj (ft)									Others (ft)	
Outfall @ AFF	10+57.36	0	108	108	0.013	1066.00	1052.00	0.00	0.00	0	0.00	0.00	0	0	0	1.00	7.66	63.62	0.910	0.0109	0.0034	0.470	0.000	0.041	0.000	0.000	0.000	0.000	0.000	1061.00	1061.91	OK	OK		5.00	14.00
AFF to ADOT MH	11+07.36	41a	140	102	0.013	1066.00	1052.33	0.00	0.00	1	0.05	0.05	0	0	0	1.00	7.66	63.62	0.910	0.0109	0.0034	0.252	0.000	0.582	0.000	0.000	0.000	0.000	0.470	1061.21	1062.12	OK	OK		4.79	13.67
MH to ADOT Stubout	11+82.36	41b	75	102	0.013	1066.00	1052.51	0.00	0.64	0	0.00	0.64	0	0	0	1.00	7.66	63.62	0.910	0.0109	0.0034	0.252	0.000	0.582	0.000	0.000	0.293	1061.37	1062.28	OK	OK		4.63	13.49		
Stubout to 97th Ave	13+21.00	41c	138.64	102	0.013	1066.60	1052.84	0.10	0.00	1	0.05	0.05	0	0	0	1.00	7.66	63.62	0.910	0.0109	0.0034	0.466	0.001	0.041	0.000	0.000	1.048	1062.16	1063.07	OK	OK		3.44	12.76		
97th to 95th Ave	26+42.00	41d	132.1	102	0.013	1068.00	1056.00	0.00	0.00	0.15	0.14	0.28	7	0	0	1.00	7.62	63.62	0.903	0.0109	0.0033	4.401	0.000	0.258	0.000	0.000	4.443	1064.20	1065.11	OK	OK		3.80	12.00		
95th to 93rd Ave	39+63.19	42a	1321.19	96	0.013	1075.00	1060.45	0.10	0.00	0.20	0.19	0.39	41	0	0	1.13	9.05	50.27	1.272	0.0109	0.0055	7.260	0.037	0.497	0.000	0.000	7.518	1067.38	1068.65	OK	OK		7.62	14.55		
93rd to 91st Ave	52+64.38	42b	1321.19	96	0.013	1077.60	1066.00	0.00	0.00	0.10	0.25	0.35	6	0	0	1.07	10.28	44.18	1.640	0.0109	0.0077	10.199	0.000	0.567	0.000	0.000	10.733	1072.17	1073.81	OK	OK		5.43	12.60		
91st to 89th Ave	65+12.02	43a	1327.64	90	0.013	1084.00	1069.46	0.10	0.00	0.27	0.19	0.46	60	0	0	1.00	8.94	44.18	1.241	0.0109	0.0058	7.758	0.038	0.566	0.000	0.000	8.325	1076.65	1077.89	OK	OK		7.35	14.54		
89th to 87th Ave	79+39.66	43b	1327.64	90	0.013	1089.60	1074.00	0.00	0.00	0.10	0.24	0.34	7	0	0	1.07	10.21	38.48	1.619	0.0109	0.0084	11.095	0.000	0.555	0.000	0.000	11.699	1081.90	1083.52	OK	OK		7.70	15.60		
87th to 85th Ave	92+66.94	43c	1327.28	90	0.013	1092.40	1078.48	0.00	0.00	0.10	0.24	0.34	8	0	0	1.00	10.08	38.48	1.578	0.0109	0.0081	10.812	0.000	0.532	0.000	0.000	11.367	1087.39	1088.97	OK	OK		5.01	13.92		
85th to 83rd Ave	105+94.22	43d	1327.28	90	0.013	1095.80	1083.00	0.00	0.00	0.10	0.23	0.33	4	0	0	1.00	10.03	38.48	1.562	0.0109	0.0081	10.700	0.000	0.522	0.000	0.000	11.232	1092.79	1094.35	OK	OK		3.01	12.80		
83rd to Myrtle Ave	119+03.98	44a	1309.76	72	0.013	1103.00	1087.72	0.10	1.04	0.75	0.14	1.93	169	0	0	1.17	7.78	28.27	0.940	0.0109	0.0060	7.805	0.003	1.815	0.000	0.000	8.327	1097.46	1098.40	OK	OK		5.54	15.28		
Myrtle to Orangewood	132+13.74	44b	1309.76	72	0.013	1106.00	1092.43	0.00	0.00	0.10	0.14	0.24	14	0	0	1.00	7.64	28.27	0.906	0.0109	0.0057	7.523	0.000	0.214	0.000	0.000	9.342	1102.73	1103.63	OK	OK		3.27	13.57		
Orangewood to 79th Ave	158+53.74	4	2640	72	0.013	1113.60	1097.45	0.10	1.04	0.25	0.17	1.46	57	0	0	1.09	6.69	23.76	0.695	0.0109	0.0050	13.069	0.008	1.018	0.000	0.000	13.283	1109.07	1109.76	OK	OK		4.53	16.15		
79th to 77th Ave	171+73.74	5a	1320	66	0.013	1116.90	1100.22	0.10	0.00	0.20	0.09	0.29	35	0	0	1.10	6.32	19.63	0.619	0.0109	0.0050	6.607	0.025	0.181	0.000	0.000	7.633	1113.16	1113.78	OK	OK		3.74	16.68		
77th to 75th Ave	184+93.74	5b	1320	60	0.013	1121.30	1103.00	0.10	0.00	0.20	0.06	0.28	29	0	0	1.00	4.89	19.63	0.371	0.0109	0.0030	3.960	0.005	0.095	0.000	0.000	4.167	1115.41	1115.78	OK	OK		5.89	18.30		
75th to 73rd Ave	198+13.74	5a	1320	54	0.013	1124.00	1105.50	0.10	0.00	0.10	0.06	0.18	14	0	0	1.11	5.22	15.90	0.423	0.0109	0.0039	5.193	0.018	0.069	0.000	0.000	5.293	1117.81	1118.24	OK	OK		6.19	18.50		
73rd to 71st Ave	211+33.74	5b	1320	48	0.013	1128.40	1108.00	0.00	0.00	0.20	0.04	0.24	33	0	0	1.13	3.98	12.57	0.246	0.0109	0.0027	3.632	0.000	0.058	0.000	0.000	3.619	1119.68	1119.92	OK	OK		6.72	18.40		
71st to 69th Ave	224+53.74	7	1320	42	0.013	1130.40	1113.00	0.10	0.00	0.00	0.06	0.06	0	0	0	1.14	5.20	9.62	0.419	0.0109	0.0055	7.199	0.046	0.026	0.000	0.000	7.257	1122.82	1123.24	OK	OK		7.58	17.40		
69th to 67th Ave	237+73.74	7a	1320	66	0.013	1133.40	1118.00	0.34	0.00	0.00	0.13	0.13	0	0	0	0.64	7.53	23.76	0.881	0.0109	0.0063	8.282	0.191	0.117	0.000	0.000	8.355	1126.18	1127.06	OK	OK		7.22	15.40		
67th to 66th Ave	244+33.74	8	660	66	0.013	1138.00	1119.00	0.10	0.00	0.30	0.02	0.32	71	0	0	1.00	4.55	23.76	0.321	0.0109	0.0023	1.507	0.015	0.101	0.000	0.000	1.815	1127.73	1128.05	OK	OK		10.27	19.00		
66th to Frier Dr	257+53.74	9	1320	54	0.013	1146.00	1124.00	0.10	1.04	0.00	0.07	1.11	0	0	0	1.10	5.50	19.63	0.470	0.0109	0.0038	5.012	0.000	0.522	0.000	0.000	5.129	1129.97	1130.44	OK	OK		16.03	22.00		
Frier Dr to 65th Ave	264+13.74	10	660	54	0.013	1142.00	1126.00	0.00	1.04	0.00	0.02	1.08	0	0	0	1.00	5.50	19.63	0.470	0.0109	0.0038	2.506	0.000	0.500	0.000	0.000	3.028	1131.63	1132.10	OK	OK		10.37	16.00		
65th to Northern Ave	277+33.74	11	1320	48	0.013	1145.00	1131.00	0.10	0.00	0.00	0.07	0.07	0	0	0	1.25	5.65	12.57	0.496	0.0109	0.0054	7.121	0.026	0.037	0.000	0.000	7.621	1135.33	1135.82	OK	OK		9.67	14.00		
65th to 67th Ave	290+53.74	12	1320	54	0.013	1143.00	1135.50	0.00	0.00	0.00	0.11	0.11	0	0	0	0.89	6.98	15.90	0.756	0.0109	0.0070	9.287	0.000	0.088	0.000	0.000	9.350	1139.34	1140.09	OK	OK		3.66	7.50		

TRANSMITTAL

RECEIVED



COE & VAN LOO

MAR 5 1998

TO: JAMES TAILLON  
c/o WOOD, PATEL & ASSOC.  
1550 E. MISSOURI, SUITE 203  
PHOENIX, AZ 85014

DATE: 3-6-98  
PROJECT: SUMMERSETT VILLAGE  
PROJECT NO: 960006-07  
SUBJECT: NORTHERN/ORANGEWOOD STORM DRAIN

ATTN: JAMES TAILLON

TRANSMITTING VIA: MESSENGER

ENCLOSED \_\_\_\_\_ UNDER SEPARATE COVER \_\_\_\_\_

THE FOLLOWING ARE SUBMITTED:

- ORIGINALS
- PHOTOCOPIES
- PRINTS
- FEES (SEE BELOW)
- OTHER (SEE BELOW)
- AS REQUESTED
- FOR YOUR INPUT
- FOR YOUR APPROVAL
- FOR YOUR SIGNATURE
- FOR YOUR REPLY/ACTION
- FOR YOUR INFORMATION/FILE

NO. OF COPIES	DATED	DESCRIPTION
1		NORTHERN/ORANGEWOOD STORM DRAIN CONCEPT ROUTING STUDY

REMARKS OR REPLY \_\_\_\_\_

Jim:

APPRECIATE THE QUICK RESPONSE TO OUR REQUEST, & YOUR EXPLANATORY NOTE & README.TXT FILE.

COPY TO: PS, JG, NR, FILES

SINCERELY,  
COE & VAN LOO

Nasir Raja

NASIR RAZA, P.E.

RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

# Ricker, Atkinson, McBee & Assoc., Inc.

2105 S. Hardy Dr., Suite 13  
Tempe, Arizona 85282  
(602) 921-8100  
Fax: (602) 921-4081

## FAX TRANSMISSION COVER SHEET

Date: 2/26/98

To: JAMES

Firm: WOOD, PATEL

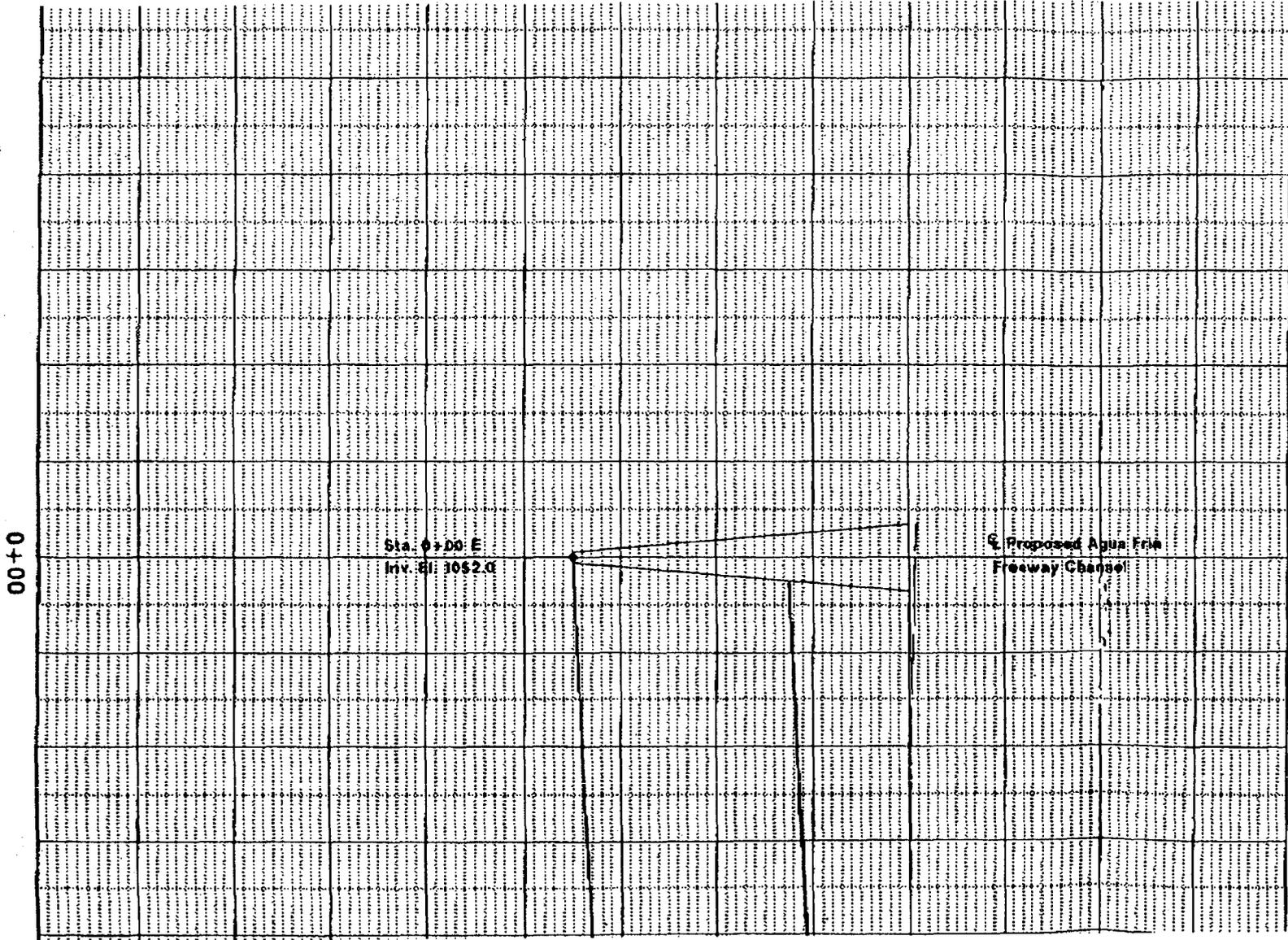
Fax: 234-1322

Re: \_\_\_\_\_

Sender: Nicole / Ken Ricker

Notes: \_\_\_\_\_

YOU SHOULD RECEIVE 3 PAGE(S), INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL (602) 921-8100.





**Bolduc, Smiley & Associates, Inc.** 5080 NORTH 40TH STREET, SUITE 250  
 (FAX 952-1134) PHOENIX, ARIZONA 85018  
 (602) 952-1577

# Letter of Transmittal

PROJECT # : 96908a  
 DATE : 2/18/98

RECEIVED  
 JUL 09 1998

WOOD, PATEL & ASSOCIATES

TO: Mr. James Taillon  
Wood, Patel & Associates, Inc.  
1550 East Missouri, Suite 203  
Phoenix, Arizona 85014

RE: Northern/Orangewood Storm Drain  
Sub-Phase "B"

WE ARE FORWARDING TO YOU:

- Plans  Information  Drawings  Report
- Diskettes  Schedule  Calculations  Contract
- Copy of Letter  Estimates  Specifications  Progress Report
- Other: \_\_\_\_\_

COPIES	DATE	DESCRIPTION
1	7/98	4 Full Size Vellums (Traffic Control)
1	7/98	Estimate of Quantities and Costs (Traffic Control)

THESE ARE TRANSMITTED:

- For Review And Comment  As Requested  For Your Approval
- For Your Information  For Your Use  For Action

REMARKS: Use lump sum \$146,700 for Traffic Control.

\_\_\_\_\_

\_\_\_\_\_

CC: \_\_\_\_\_

\_\_\_\_\_

CC TRANSMITTAL ONLY:

\_\_\_\_\_

\_\_\_\_\_

BY John Ball

**RICKER-ATKINSON-MCBEE & ASSOCIATES**

*Specializing in geotechnical engineering and construction materials testing*

2105 South Hardy Drive, Suite 13, Tempe 85282 (602) 921-8100

Fax: (602) 921-4081

**LETTER OF TRANSMITTAL**

TO: Wood, Patel & Associates  
1550 E. Missouri, Suite 203  
Phoenix, AZ 85014

DATE: February 2, 1998

ATTN: Ashok Patel, P.E.

FROM: Kenneth L. Ricker, P.E.

SUBJECT: Northern/Orangewood Storm Drain Project Phase II  
Glendale Avenue  
99th Avenue to 83rd Avenue  
Glendale, Arizona

R.A.M. Project No. G01522

Enclosed please find :

Geotechnical Engineering Report

Materials Testing Report

Fee Schedule

Other: Photos of Soil Encountered in Test Borings

For Your:

Information

Review and Comment

Use

Signature and Return of 1 Copy

Remarks: If you have any questions, please do not hesitate to call.

Respectfully submitted,

**RICKER-ATKINSON-MCBEE & ASSOCIATES**

Kenneth L. Ricker FOR:  
Kenneth L. Ricker, P.E.



WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: City of Peoria

8401 W Monroe Street

Peoria, Az 85345

DATE: July 14, 1998

JOB NO. 94153.04

ATTENTION: Burton Charron

RE: Northern/Orangewood Storm Drain

Glendale Avenue Storm Drain, Sub-Phase B

60% Plan Submittal

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other : Special Provisions , Cost Estimate, Bid Schedule

COPIES	DATE	NO.	DESCRIPTION
1		33	60% Full Size Blueline Plans
1		33	Half Size Plans
1			Drainage Report
1			Special Provisions
1			Cost Estimate
1			Bid Schedule

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

REMARKS:

Burton,

The 60% review comment meeting is scheduled for July 30, 1998 at the Flood Control District. Please plan on attending if you have any comments or concerns regarding this submittal.

Thank You.

COPY TO: Project File, FCDMC

SIGNED: James Taillon

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: City of Glendale

5850 W Glendale Ave

Glendale, Az 85301

DATE: July 14, 1998

JOB NO. 94153.04

ATTENTION: Dan Sherwood

RE: Northern/Orangewood Storm Drain

Glendale Ave Storm Drain, Phase II, Sub-Phase B

60% Submittal

WE ARE SENDING YOU ● Attached ○ Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other : Special Provisions , Cost Estimate, Bid Schedule

COPIES	DATE	NO.	DESCRIPTION
1		33	60% Full Size Blueline Plans
1		33	Half Size Plans
1			Drainage Report
1			Special Provisions
1			Cost Estimate
1			Bid Schedule

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

REMARKS:

Dan,

The 60% review comment meeting is scheduled for July 30, 1998 at the Flood Control District. Please plan on attending if you have any comments or concerns regarding this submittal.

Thank You.

COPY TO: Project File, RW Shobe - FCDMC, Grant  
Anderson - COG

SIGNED: James Taillon

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: De Leuw Cather

DATE: July 13, 1998	JOB NO. 94153.04
ATTENTION: Lee Dixon	
RE: Northern/Orangewood Storm Drain	
Phase II, Sub-Phase B	
Glendale Avenue Storm Drain	

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Bluelines     Specifications
- Copy of letter     Drainage Report     Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		1	Sheet 6, 60% plans Glendale Ave Storm Drain at AFF Channel

THESE ARE TRANSMITTED as checked below:

- For approval     Approved as submitted     Approved as noted
- For your use     As requested     For review and comment

REMARKS:


COPY TO: Project File

SIGNED: James Taillon

RGCP

278-3526

Stu Waller

ax 484-0705

Hydro Conduit

.328

228

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 2

DATE: 7-8-98

TIME: 11:40

FAX NO: 484-0705

TO: STU Waller

FROM: James Taillon

PROJECT: Northern Orangewood

JOB NO.: 94153.04

COMMENTS: Please estimate cost's on the following items for RGCP and concrete lined RCP.

Thank You

copy to:

hard copy to follow in mail

**Glendale Ave Storm Drain Phase II, Sub Phase "B"**

Contract FCD - Phase II, Sub Phase B

W/P Job No.

7/8/98

94153.04

**BID TAB SUMMARY BY SHEET (60% SUBMITTAL)**

BID TAB ITEM NO.	DESCRIPTION	UNIT	SHEET NO.													TOTAL	
			6	7	8	9	10	11	12	13	14	15	16	17			
618-1	RGRCP TRUNK LINE PIPE (102")	LF	495.7	950													1446
618-2	RGRCP TRUNK LINE PIPE (96")	LF			935	960	40										1935
618-3	RGRCP TRUNK LINE PIPE (90")	LF					904.2	960	960	960	193						3977
618-4	RGRCP TRUNK LINE PIPE (84")	LF									755	960	258.2				1973
618-5	RGRCP TRUNK LINE PIPE (72")	LF											185				185
618-6	RGRCP TRUNK LINE PIPE (66")	LF											162.8				163
618-7	RGRCP TRUNK LINE PIPE (42")	LF													238.6		239
618-8	RGRCP TRUNK LINE PIPE (36")	LF		79.6							68.1						148
618-9	RGRCP CATCH BASIN CONNECTOR PIPE (15")	LF	81.4	13	81.5	8	93.8	82	102.6	20.4	164.9	82.6	63.5				794
618-10	RGRCP CATCH BASIN CONNECTOR PIPE (18")	LF		75.5		73.8					43.6			20			213
618-11	RGRCP CATCH BASIN CONNECTOR PIPE (24")	LF					69.7						64.2				134
618-12	RGRCP CATCH BASIN CONNECTOR PIPE (30")	LF													65.4		65
618-13	RGRCP CATCH BASIN CONNECTOR PIPE (36")	LF		54													54
618-21	102" x 102" x 15" PREFABRICATED TEE	EA	2	2													4
618-22	102" x 102" x 18" PREFABRICATED TEE	EA		1													1
618-23	96" x 96" x 15" PREFABRICATED TEE	EA			2	1	3										6
618-24	96" x 96" x 24" PREFABRICATED TEE	EA					1										1
618-25	96" x 96" x 42" PREFABRICATED TEE	EA					1										1
618-26	90" x 90" x 15" PREFABRICATED TEE	EA						1	3	1							5
618-27	84" x 84" x 15" PREFABRICATED TEE	EA									3	2					5
618-28	72" X 72" X 15" PREFABRICATED TEE	EA												2			2
618-29	66" X 66" X 18" PREFABRICATED TEE	EA												1			1
618-30	66" X 66" X 24" PREFABRICATED TEE	EA												1			1
618-31	36" X 36" X 36" PREFABRICATED TEE	EA		1													1
618-32	36" X 36" X 18" PREFABRICATED TEE	EA									1						1
618-33	102" X 96" REDUCER	EA		1													1
618-34	90" X 84" REDUCER	EA										1					1

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 2

DATE: July 2

TIME: 11:40

FAX NO: 234-1322

TO: Brian Roche

FROM: James Taillon

PROJECT: Northern Orangewood

JOB NO.: 94153-04 "B"

COMMENTS: Any help you can provide for the pricing of the following items would be appreciated. (concrete lined CMP)  
Thank You

copy to:

hard copy to follow in mail

# WOOD/PATEL

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PROJECT Northern Orange wood

PROJECT No. \_\_\_\_\_ SHEET No. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY \_\_\_\_\_ DATE \_\_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

# Each	Size	Type
4	102" x 102" x 15"	Tee
1	102" x 102" x 18"	Tee
1	36" x 36" x 36"	Tee
6	96" x 96" x 15"	Tee
1	96" x 96" x 24"	Tee
5	90" x 90" x 15"	Tee
1	36" x 36" x 18"	Tee
5	84" x 84" x 15"	Tee
2	72" x 72" x 18"	Tee
2	72" x 72" x 15"	Tee

**woodpatl**

---

From: woodpatl <woodpatl@netzone.com>  
To: Dan Sherwood @ COG <Sherwood@ci.glendale.az.us>  
Subject: Norhern/Orangewood Phase II B - Glendale Avenue Storm Drain  
Date: Wednesday, July 01, 1998 8:14 AM

Dan,

I just wanted to touch bases with you on couple of issues. I sent you a fax this morning showing the revised storm drain alignment at at AFF based on my discussion with Lee Dixon (De Leuw Cather) and yourself. Please let me know if this is acceptable.

I also wanted to know if you have determined the impact to the NPDES of tying the RID irrigation line into the storm drain. We have not asked Stan Ashby (RID) to persue whether or not this is an option until we are sure this tie in is acceptable to the city. We are proceeding with the 60% plans based on the assumption that there will be a conflict structure at this location.

Thank you.

Tailon, James

**From:** Castaneda, Jeff  
**Sent:** Wednesday, July 01, 1998 8:31 AM  
**To:** McCarty, Joel; Tailon, James  
**Subject:** FW: Norhern/Orangewood Phase II B - Glendale Avenue Storm Drain

-----Original Message-----

**From:** Dan Sherwood [SMTP:SHERWOOD@ci.glendale.az.us]  
**Sent:** Wednesday, July 01, 1998 8:17 AM  
**To:** woodpatl@netzone.com  
**Subject:** Re: Norhern/Orangewood Phase II B - Glendale Avenue Storm Drain

The consultant is recommending that we don't do it but it is really up to ADOT since we outlet to their channel and they output to the Waters of the US. You may want to check with them.

>>> "woodpatl" <woodpatl@netzone.com> Jul 1, 1998 8:14 AM >>>

Dan,

I just wanted to touch bases with you on couple of issues. I sent you a fax this morning showing the revised storm drain alignment at at AFF based on my discussion with Lee Dixon (De Leuw Cather) and yourself. Please let me know if this is acceptable.

I also wanted to know if you have determined the impact to the NPDES of tying the RID irrigation line into the storm drain. We have not asked Stan Ashby (RID) to persue whether or not this is an option until we are sure this tie in is acceptable to the city. We are proceeding with the 60% plans based on the assumption that there will be a conflict structure at this location.

Thank you.

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

Bolduc, Smiley & Associates, Inc

5080 North 40<sup>th</sup> Street, Suite 250

Phoenix, Arizona 85018

DATE: June 26, 1998	JOB NO. 94153.04
ATTENTION: Terry Smiley	
RE: Northern/Orangewood Storm Drain	
Glendale Avenue - Sub-Phase "B"	

WE ARE SENDING YOU ● Attached ○ Under separate cover via PICK-UP the following items:

- Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Bluelines     Specifications
- Copy of letter     Drainage Report     Other\_(Plan View Alignment)

COPIES	DATE	NO.	DESCRIPTION
1		16	30% Design Plans

THESE ARE TRANSMITTED as checked below:

- For approval     Approved as submitted     Approved as noted
- For your use     As requested     For review and comment

REMARKS: Terry,

Attached is a copy of the 30% plans for the Storm Drain in Glendale Avenue (Agua Fria Freeway to 83<sup>rd</sup> Ave) for your use in preparing plans for the 60% submittal of this project. Also, please let us know if you intend to make any revisions to the narrative used in the 30% report. Please let us know if you expect your plan reparation to extend beyond July 10<sup>th</sup>.

If you have any questions or require additional information, please let me know.

Thank You

COPY TO: Project File

SIGNED: James Taillon

**woodpatl**

---

From: woodpatl <woodpatl@netzone.com>

To: R.W. Shobe@FCDMC <rws@mail.maricopa.gov>

Cc: Dan Sherwood @ COG <Sherwood@ci.glendale.az.us>; Grant Anderson @ COG <Grant@ci.glendale.az.us>

Subject: Nothern/Orandewood PhII B - Strom Drain Alignment at Agua Fria Freeway Channel

Date: Friday, June 26, 1998 7:23 AM

Based on input from both the city of Glendale (Dan Sherwood) and De leuw Cather (Lee Dixon), the storm drain alignment in Glendale Avenue from the Agua Fria Freeway Channel to 97th Avenue will be relocated from 33' south to 37' south of the monument line. The storm drain will then transition back to the 33' offset between 97th and 95th Avenues. This storm drain realignment will provide a corridor in Glendale Avenue for a 36" sleeve which ADOT will be installing for a future city of Glendale 24" effluent line. If you have any comments or concerns regarding this issue please let us know. Thank you.

**FAX TRANSMITTAL**

PAGE 1 OF 2

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

DATE: June 26, 1998

TIME: 10:49 AM

TO: Lee Dixon

COMPANY: De Leuw Cather

FAX NO.: 952-9303

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase B

JOB NO.: 94153.04

SUBJECT: Storm Drain Horizontal Alignment at Agua Fria Freeway

COMMENTS:

Lee,

Attached is a copy of the proposed storm drain alignment based on my discussions with you and Dan Sherwood (City of Glendale). We have moved the storm drain from 33' to 37' south of the monument line from the Agua Fria freeway to 97<sup>th</sup> Avenue. Please let me know if this satisfies your request or if you require additional information

Thank You

CC: RW Shobe, File *Don Sherwood - COG*

*915-2089*



**woodpatl**

---

From: woodpatl <woodpatl@netzone.com>  
To: R.W. Shobe@FCDMC <rws@mail.maricopa.gov>  
Cc: Burton Charron@CityofPeoria <burtonc@peoriaaz.com>; Dan Sherwood @ COG <Sherwood@ci.glendale.az.us>; Grant Anderson @ COG <Grant@ci.glendale.az.us>; Richard Harris @ FCDMC <RPH@mail.maricopa.gov>; Mike Lopez@FCDMC <MAL@MAIL.MARICOPA.GOV>  
Subject: Northern/Orangewood Phases II B and C  
Date: Wednesday, June 24, 1998 9:50 AM

Please review the attached review comments and let us know if you have any additional comments or concerns.

June 24, 1998

Northern/Orangewood Storm Drain Project Phase II, B  
Glendale Avenue Storm Drain  
W/P # 94153.04

**Response to Comments  
for  
Storm Drain-Irrigation Line Conflict Structure**

The following are Wood/Patel's responses to comments made on the Conflict Structures by Richard Harris, FCDMC, dated June 18, 1998. Please let us know by June 29, 1998 if you have any concerns with these responses so that we may proceed with the 60% design.

Comment # 1

Overall, the suggested design is unfavorable, and alternatives such as siphons or transitions with box culverts under the irrigation lines are considered preferable.

Response # 1

The use of siphons has been discussed and eliminated as an acceptable alternative. SRP would only consider a siphon if the city of Glendale (COG) were to agree to a maintenance agreement. The COG does not wish to engage in such an agreement. Both the COG and the FCDMC were opposed to siphoning the storm drain.

Box structures were looked at as an alternative to the proposed structure. However, due to the limited vertical clearance at all three crossing locations a very shallow, wide and long structure would be required. The following structure size would be required at the three crossing locations:

<u>Location</u>	<u>Irrigation Line</u>	<u>Storm Drain</u>	<u>Box Culvert w/ 4:1 &amp; 2:1 Transitions</u>
13+25.5	36"	96" in/102" out	2-10'x3' Box (23.4'wide x 43.3'long)
26+95.5	24"	96" in/ 96" out	2-10'x3' Box (23.4'wide x 43.8'long)
54+40.0	36"	90" in/ 90" out	2-8'x3' Box (18.9'wide x 32.8'long)

The width of these structures would also conflict with the existing 15" sanitary sewer in Glendale Avenue. For this reason, the box type structure was eliminated from further consideration.

Comment # 2

If the current design is to be selected, the following should be included:

A) Structure dimensions and shape should be such that there will be a 4:1 or longer expansion possible for flows which will enter the structure, before reaching the upstream edge of the Irrigation line sleeve. In addition, the dimensions and shape of the structure downstream of the irrigation line should be such that a 2:1 or longer contraction is possible for flows between the downstream edge of the irrigation line sleeve and the pipe entrance. The clear area under the irrigation line should either be the area of full flow for an equivalent diameter pipe, or the area of the currently proposed pipe, whichever is greater.

Response # 2A

Will comply.

B) Given the suggested dimensions in number 2, above, the increased potential for utility conflicts by building the structures should be checked.

Response # 2B  
Will comply.

(C) The cast iron pipe sleeve should be coated with some type of rust inhibitor.

Response #2C  
Will Comply.

D) Unless documentation is provided to substantiate a lower value, the loss coefficient, "K", used in the hydraulic model for these structures should have a value of at least 0.8.

Response # 2D

With the use of transitions from comment # 2A and an equivalent flow area between the bottom of the Irrigation pipe sleeve and the invert of the box, we would recommend using a loss coefficient of 0.4. This will create a loss through the structures of approximately 0.5'. A coefficient of 0.8 in our opinion is very high. It would cause a loss through the structures of approximately 1' which is comparable to a 90° bend which we feel is excessive.

E) The structure should include an access hole to allow for proper maintenance.

Response # 2E  
Will Comply.

cc: RW Shobe-FCDMC  
Mike Lopez- FCDMC  
Richard Harris-FCDMC  
Grant Anderson-City of Glendale  
Dan Sherwood-City of Glendale  
Burton Charron-City of Peoria



**Northern/ Oranewood  
Glendale Ave Storm Drain, Sub-Phase "B"**

June 22, 1998

Contract FCD 94-12 Phase II

W/P Job No. 94153.04

Allwaste/North American Locating

<b>Glendale Avenue</b>				
<b>Pothole Number</b>	<b>Location</b>	<b>Mainline Station</b>	<b>Offset</b>	<b>Utility</b>
1	Mainline	13+26	33' Rt	36" Irrigation
2	Lateral	19+78	30' Lt	Telephone
3	Mainline	26+95	33' Rt	24" Irrigation
4	Lateral	32+98	30' Lt	Telephone
5	Lateral	39+59	30' Lt	Telephone
6	Lateral	46+20	30' Lt	Telephone
7	Mainline	52+20	29' Rt	12" Irrigation
8	Mainline	52+43	29' Rt	36" Irrigation
9	Mainline	53+45	29' Rt	24" Irrigation
10	Lateral	105+65	115' Lt	Telephone
11	Lateral	105+82	115' Lt	4" Gas
12	Mainline	106+14	21' Rt	Telephone

\* Station 0+00.00 at the Monument line intersection of 99th Ave and Glendale Ave

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Allwaste/North American Locating

1801 West Watkins

Phoenix, Az 85007

DATE: June 19, 1998

JOB NO. 94153.04

ATTENTION: Andrew Duquette

RE: Northern/Orangewood Storm Drain

Glendale Avenue Storm Drain Sub-Phase B

Pothole Request

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings   
  Design Plans (11x17)   
  Plans (Full Size)   
  Bluelines   
  Specifications  
 Copy of letter   
  Drainage Report   
  Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		16	Half Size 30% Plans
1		1	List of Pothole Locations

THESE ARE TRANSMITTED as checked below:

- For approval   
  Approved as submitted   
  Approved as noted  
 For your use   
  As requested   
  For review and comment

**REMARKS:.**

Andrew,

Please let me know when you anticipate having these potholes completed . Feel free to call me if you have any questions or concerns.

Thank You

COPY TO: Project File

SIGNED: James Taillon

**Northern/ Oranewood  
Glendale Ave Storm Drain, Sub-Phase "B"**

June 19, 1998

Contract FCD 94-12 Phase II

W/P Job No. 94153.04

Allwaste/North American Locating

<b>Glendale Avenue</b>				
<b>Pothole Number</b>	<b>Location</b>	<b>Mainline Station</b>	<b>Offset</b>	<b>Utility</b>
1	Mainline	13+26	33' Rt	36" Irrigation
2	Lateral	19+78	30' Lt	Telephone
3	Mainline	26+95	33' Rt	24" Irrigation
4	Lateral	32+98	30' Lt	Telephone
5	Lateral	39+59	30' Lt	Telephone
6	Lateral	46+20	30' Lt	Telephone
7	Mainline	52+20	29' Rt	12" Irrigation
8	Mainline	52+43	29' Rt	36" Irrigation
9	Mainline	53+45	29' Rt	24" Irrigation

\* Station 0+00.00 at the Monument line intersection of 99th Ave and Glendale Ave

Tailon, James

**From:** Jaeger, Darrell  
**Sent:** Thursday, June 18, 1998 4:35 PM  
**To:** McCarty, Joel; Tailon, James  
**Subject:** FW: Northern/Orangewood Phase II B

-----Original Message-----

**From:** R. W. Shobe - FCDX [SMTP: rws@mail.maricopa.gov]  
**Sent:** Thursday, June 18, 1998 4:21 PM  
**To:** 'woodpatl'  
**Subject:** RE: Northern/Orangewood Phase II B

I thought I had notified you that you were to proceed with the potholing using your sub I have note to that effect. As for the railroad Olin is working on it and it should go out this week. Thanks for the follow-up.

> -----Original Message-----

> From: woodpatl [SMTP: woodpatl@netzone.com]  
> Sent: Thursday, June 18, 1998 10:10 AM  
> To: RW Shobe @ FCDMC  
> Subject: Northern/Orangewood Phase II B  
>  
> RW,  
> I just wanted to touch bases with you on a couple of outstanding  
> issues. I  
> wanted to verify that the application for pipe crossing at the  
> railroad has  
> been submitted and that the additional potholes for irrigation line  
> crossings have been ordered. If you require additional information or  
> assistance from Wood/Patel to address these items please let me know.

>  
>

Thank You

Taillon, James

**From:** Jaeger, Darrell  
**Sent:** Thursday, June 18, 1998 4:36 PM  
**To:** Taillon, James  
**Subject:** FW: Storm Drain-Irrigation Line Conflict Structure

-----Original Message-----

**From:** Richard Harris - FCDX [SMTP:rph@mail.maricopa.gov]  
**Sent:** Thursday, June 18, 1998 2:32 PM  
**To:** 'woodpatl@netzone.com'  
**Cc:** R. W. Shobe - FCDX; Michael Lopez - FCDX  
**Subject:** Storm Drain-Irrigation Line Conflict Structure

I have reviewed a sketch of the proposed structure as depicted on the FAX sent to the District by James Taillon of your firm, dated June 15th, 1998. I offer the following comments:

- 1) Overall, the suggested design is unfavorable, and alternatives such as siphons or transitions with box culverts under the irrigation lines are considered preferable.
- 2) If the current design is to be selected, the following should be included:
  - A) Structure dimensions and shape should be such that there will be a 4:1 or longer expansion possible for flows which will enter the structure, before reaching the upstream edge of the Irrigation line sleeve. In addition, the dimensions and shape of the structure downstream of the irrigation line should be such that a 2:1 or longer contraction is possible for flows between the downstream edge of the irrigation line sleeve and the pipe entrance. The clear area under the irrigation line should either be the area of full flow for an equivalent diameter pipe, or the area of the currently proposed pipe, whichever is greater.
  - B) Given the suggested dimensions in number 2, above, the increased potential for utility conflicts by building the structures should be checked.
  - C) The cast iron pipe sleeve should be coated with some type of rust inhibitor.
  - D) Unless documentation is provided to substantiate a lower value, the loss coefficient, "K", used in the hydraulic model for these structures should have a value of at least 0.8.
  - E) The structure should include an access hole to allow for proper maintenance.

Taillon, James

**From:** Jaeger, Darrell  
**Sent:** Wednesday, June 17, 1998 2:02 PM  
**To:** Taillon, James  
**Subject:** FW: Northern/orangewood storm drain junction box

-----Original Message-----

**From:** Bob Maurer [SMTP:btmaurer@srp.gov]  
**Sent:** Wednesday, June 17, 1998 1:41 PM  
**To:** wood patel and associates  
**Subject:** Northern/orangewood storm drain junction box

James Taillon;

We will be happy to have our structural engineers review your design as soon as you submit more than conceptual. Keep in mind that SRP has not fully approved this concept and we won't unless our structural engineers will approve the supporting method through the box versus the pressures exerted by the volume of water carried through the storm sewer, etc. Your earliest submittal would be beneficial to all concerned parties. Thanks

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 4

.....  
DATE: June 16, 1998  
.....

.....  
TIME: 10:05 AM  
.....

**TO: David Schaub**

.....  
**COMPANY: BRW**

.....  
**FAX NO.: 230-9189**

.....  
**FROM: James Taillon**

.....  
**PROJECT: Northern/Orangewood Ph II, Sub-phase B**

**JOB NO.: 94153.04**

.....  
**SUBJECT: Glendale Ave storm drain outfall**

.....  
**COMMENTS:**

.....  
David,

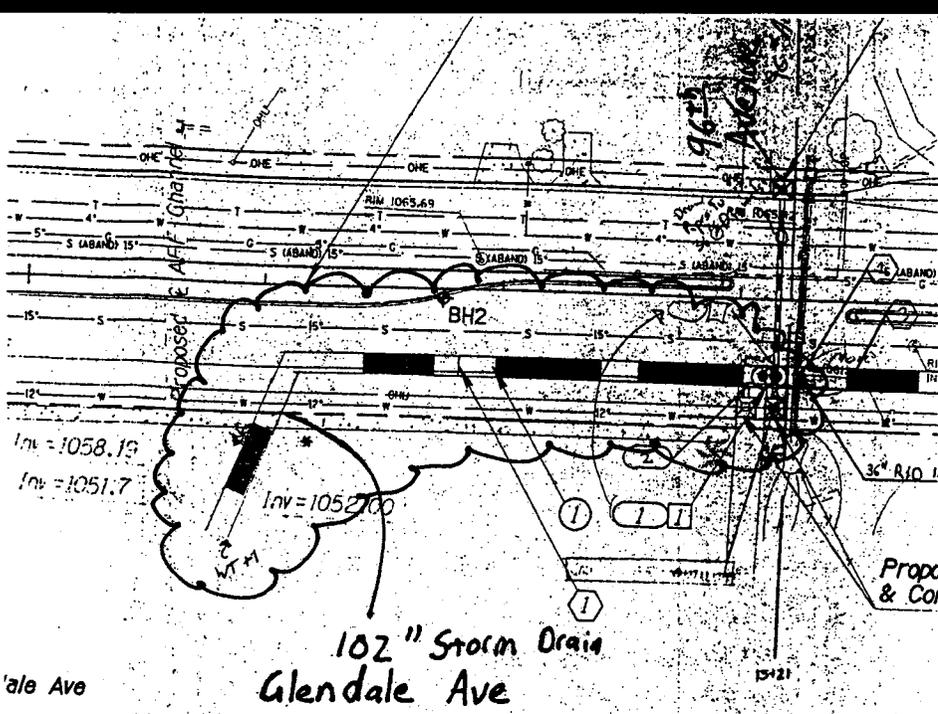
.....  
The design of the Glendale Avenue Storm Drain is based on a 10 year storm.  
.....  
We have revised the tail water at the Glendale Avenue Storm Drain outlet based on  
.....  
a 10 year 6 hour storm. From this analysis, the size of the outfall pipe can be reduced  
.....  
from 108" to 102".

.....  
This change is subject to approval by the Flood Control District. We will let  
.....  
you know when approval is received. For your information I have enclosed the HEC  
.....  
-RAS output data and profile for the Agua Fria Freeway Outfall Channel and a copy of  
.....  
the profile at the west end of the Glendale Avenue Storm Drain.

.....  
If you have any questions, please let me know.

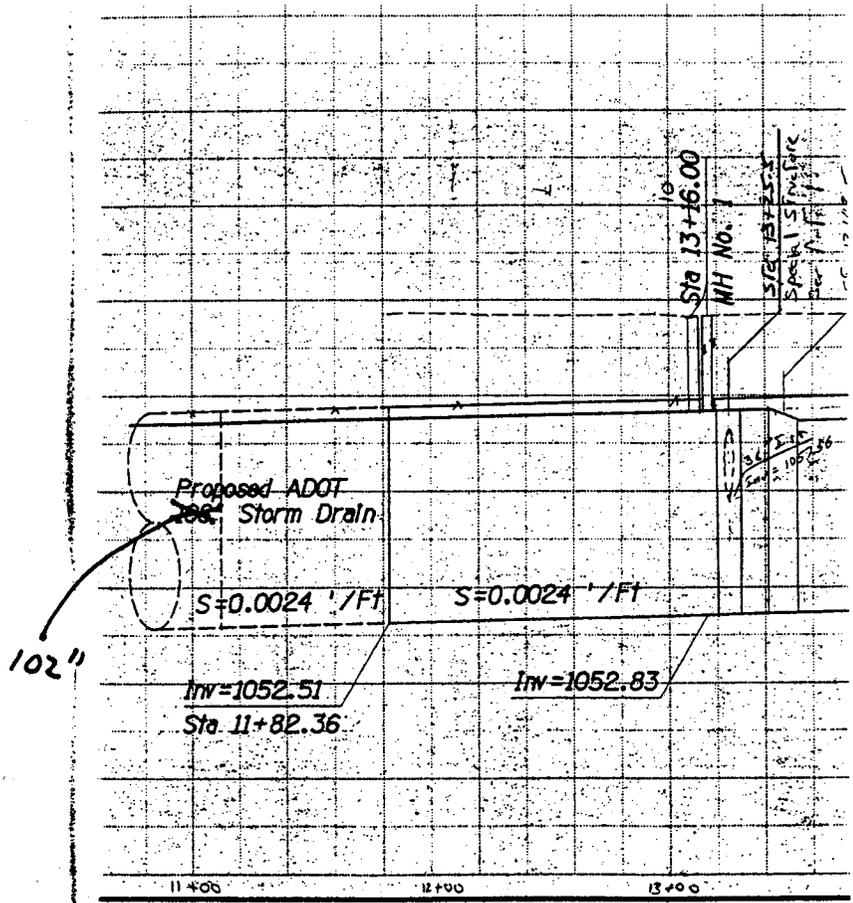
.....  
Thank You  
.....

.....  
CC: File  
.....  
.....

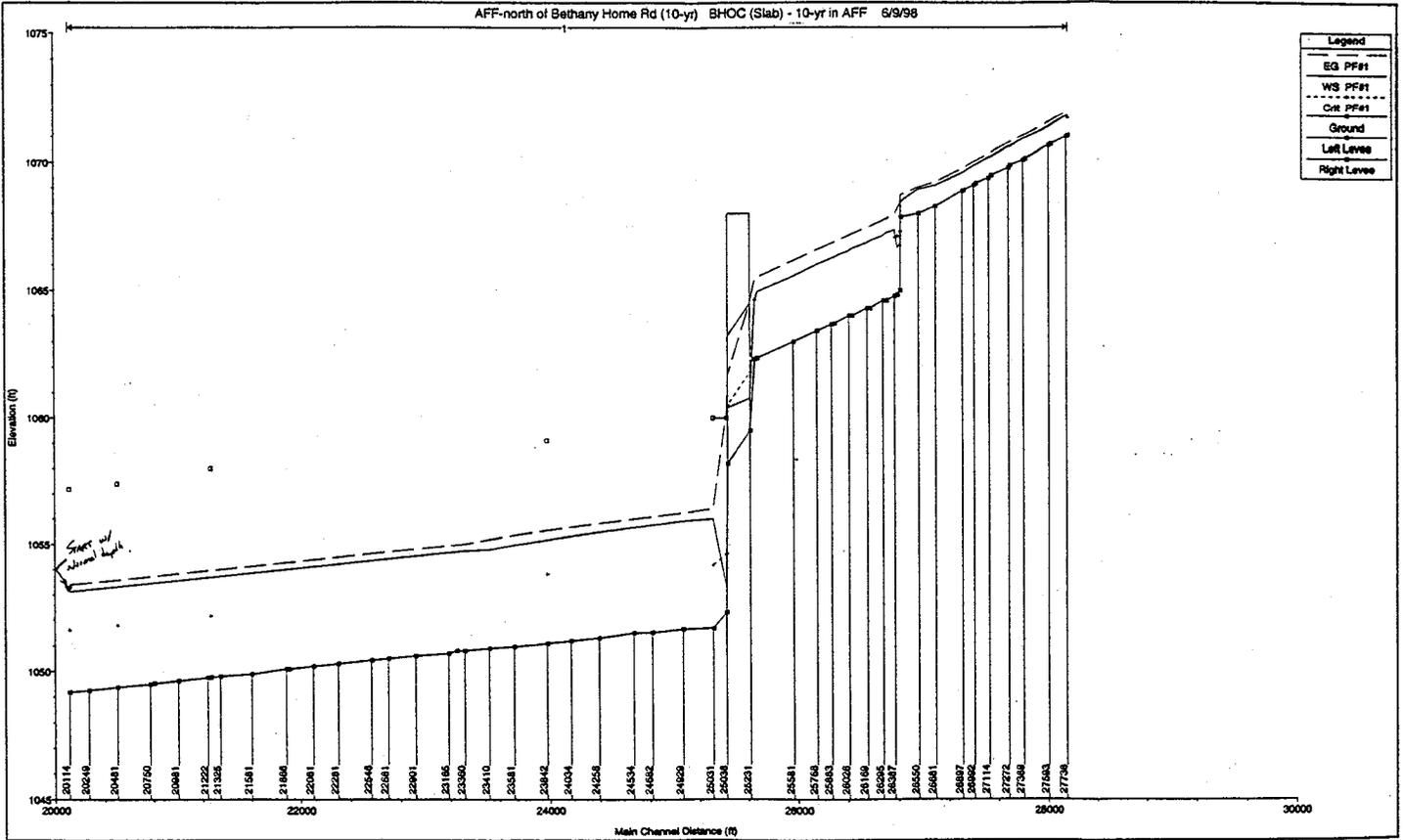


ale Ave

102" Storm Drain  
Glendale Ave



AFF-north of Bethany Home Rd (10-yr) BHOCC (Slab) - 10-yr in AFF 6/9/98



- Legend
- EQ PF#1
  - WS PF#1
  - Crt PF#1
  - Ground
  - Left Levee
  - Right Levee

HEC-RAS Plan: AFF10 River: Agua Fria N/S Reach: 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	27750	21.00	1071.02	1071.79	1071.66	1071.94	0.002465	3.12	6.74	11.89	0.73
1	27738	21.00	1070.99	1071.75		1071.91	0.002708	3.20	6.56	11.96	0.76
1	27610	21.00	1070.67	1071.41		1071.57	0.002613	3.16	6.64	11.99	0.75
1	27593	21.00	1070.63	1071.36		1071.52	0.002729	3.21	6.54	11.93	0.76
1	27406	21.00	1070.16	1070.93		1071.07	0.002129	2.95	7.11	12.21	0.68
1	27389	21.00	1070.10	1070.90		1071.03	0.002048	2.91	7.21	12.26	0.67
1	27285	21.00	1069.90	1070.59		1070.76	0.003169	3.37	6.22	11.80	0.82
1	27272	21.00	1069.80	1070.58		1070.72	0.002262	3.01	6.97	12.15	0.70
1	27136	21.00	1069.50	1070.23		1070.39	0.002605	3.16	6.65	12.00	0.75
1	27114	21.00	1069.40	1070.20		1070.33	0.002109	2.94	7.13	12.21	0.68
1	27010	21.00	1069.20	1069.92		1070.08	0.002743	3.21	6.53	11.95	0.77
1	26992	21.00	1069.12	1069.87		1070.03	0.002573	3.15	6.67	12.01	0.74
1	26910	21.00	1068.90	1069.62		1069.80	0.003080	3.34	6.28	11.80	0.81
1	26897	21.00	1068.88	1069.60		1069.76	0.002727	3.21	6.54	11.92	0.76
1	26681	21.00	1068.30	1069.11		1069.24	0.002061	2.92	7.19	12.23	0.67
1	26550	21.00	1068.01	1068.94		1069.03	0.001127	2.37	8.85	13.06	0.51
1	26492	21.00	1067.87	1068.49	1068.49	1068.72	0.004961	3.92	5.36	11.37	1.01
1	26486	200.00	1065.00	1066.81	1067.31	1068.43	0.008929	10.19	19.63	14.88	1.56
1	26409	200.00	1064.83	1066.65	1067.12	1068.20	0.008463	10.00	20.00	14.96	1.52
1	26387	200.00	1064.78	1067.36	1067.07	1067.95	0.002160	6.14	32.57	18.01	0.80
1	26322	200.00	1064.60	1067.25		1067.81	0.002015	5.99	33.39	18.17	0.78
1	26295	200.00	1064.60	1067.13		1067.74	0.002297	6.27	31.87	17.88	0.83
1	26191	200.00	1064.30	1066.94		1067.51	0.002078	6.06	33.00	18.07	0.79
1	26169	200.00	1064.30	1066.86		1067.46	0.002241	6.22	32.14	17.92	0.82
1	26049	200.00	1064.00	1066.62		1067.19	0.002094	6.08	32.92	18.07	0.79
1	26026	200.00	1064.00	1066.54		1067.15	0.002268	6.25	32.01	17.91	0.82
1	25912	200.00	1063.70	1066.31		1066.89	0.002124	6.11	32.75	18.03	0.80
1	25883	200.00	1063.66	1066.25		1066.83	0.002145	6.13	32.63	18.00	0.80
1	25768	200.00	1063.40	1066.00		1066.58	0.002123	6.10	32.78	18.06	0.80
1	25581	200.00	1062.99	1065.55		1066.17	0.002318	6.29	31.78	17.87	0.83
1	25292	200.00	1062.35	1064.94		1065.51	0.002099	6.07	32.96	18.18	0.79
1	25270	200.00	1062.31	1064.61	1064.61	1065.44	0.003488	7.29	27.44	16.87	1.01
1	25231	200.00	1059.50	1060.79	1061.81	1064.54	0.027145	15.54	12.87	10.00	2.41
1	25051	200.00	1058.20	1060.41	1060.51	1061.68	0.005399	9.06	22.07	10.00	1.08
1	25038	200.00	1052.32	1053.27	1054.64	1060.21	0.070299	21.14	9.46	10.00	3.83
1	25031	470.00	1051.70	1055.99	1054.18	1056.40	0.000688	5.15	91.19	21.52	0.44

HEC-RAS Plan: AFF10 River: Agua Fria N/S Reach: 1 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	24929	470.00	1051.65	1055.89		1056.22	0.000591	4.60	102.28	33.28	0.46
1	24682	470.00	1051.52	1055.73		1056.07	0.000614	4.66	100.89	33.13	0.47
1	24534	470.00	1051.50	1055.64		1055.98	0.000625	4.68	100.33	33.13	0.47
1	24258	470.00	1051.30	1055.46		1055.80	0.000637	4.72	99.58	32.94	0.48
1	24034	470.00	1051.19	1055.30		1055.66	0.000653	4.76	98.67	32.81	0.48
1	23842	470.00	1051.09	1055.17	1053.82	1055.53	0.000676	4.82	97.44	32.66	0.49
1	23581	470.00	1050.96	1054.96		1055.34	0.000740	4.98	94.39	32.31	0.51
1	23410	470.00	1050.90	1054.77		1055.18	0.000812	5.14	91.45	32.03	0.54
1	23360	470.00	1050.80	1054.73		1055.00	0.000516	4.22	111.42	37.64	0.43
1	23230	470.00	1050.80	1054.69		1054.97	0.000515	4.21	111.53	37.70	0.43
1	23165	470.00	1050.70	1054.66		1054.93	0.000496	4.16	112.89	37.79	0.42
1	22901	470.00	1050.60	1054.53		1054.80	0.000503	4.18	112.41	37.77	0.43
1	22681	470.00	1050.50	1054.42		1054.69	0.000506	4.19	112.17	37.76	0.43
1	22546	470.00	1050.43	1054.35		1054.62	0.000508	4.20	112.03	37.75	0.43
1	22281	470.00	1050.30	1054.22		1054.49	0.000508	4.20	112.03	37.74	0.43
1	22081	470.00	1050.20	1054.11		1054.39	0.000506	4.19	112.21	37.77	0.43
1	21886	470.00	1050.10	1054.02		1054.29	0.000505	4.19	112.26	37.77	0.43
1	21866	470.00	1050.10	1054.01		1054.28	0.000507	4.19	112.10	37.77	0.43
1	21581	470.00	1049.90	1053.87		1054.14	0.000493	4.15	113.20	37.83	0.42
1	21325	470.00	1049.81	1053.74		1054.01	0.000502	4.18	112.48	37.80	0.43
1	21247	470.00	1049.77	1053.70	1052.17	1053.97	0.000494	4.16	113.09	37.83	0.42
1	21222	470.00	1049.76	1053.69		1053.96	0.000501	4.17	112.62	37.81	0.43
1	20981	470.00	1049.63	1053.56		1053.83	0.000501	4.18	112.55	37.80	0.43
1	20786	470.00	1049.53	1053.47		1053.74	0.000500	4.17	112.63	37.81	0.43
1	20750	470.00	1049.50	1053.45		1053.72	0.000495	4.16	113.04	37.83	0.42
1	20481	470.00	1049.38	1053.31	1051.80	1053.58	0.000499	4.17	112.70	37.80	0.43
1	20249	470.00	1049.26	1053.20		1053.47	0.000491	4.15	113.32	37.86	0.42
1	20114	470.00	1049.19	1053.12	1051.61	1053.39	0.000501	4.17	112.61	37.80	0.43

## WOOD/PATEL

Wood, Patel & Associates, Inc.  
1550 East Missouri Ave., Suite 203  
Phoenix, Arizona 85014

# Fax/Memo

<b>To:</b>	R.W. Shobe	<b>From:</b>	James G. Taillon
<b>Fax:</b>	506-8561	<b>Pages:</b>	1
<b>Company:</b>	FCDMC	<b>Date/Time:</b>	06/15/98 10:34 am
<b>Project:</b>	Northern/Orangewood Phil, C	<b>Project #:</b>	94153.06
<b>Re:</b>	36" RID Irrigation Line	<b>CC:</b>	Dan Sherwood COG, File

Urgent     For Review     Please Comment     Please Reply     See Attached

● **Comments:**

RW,

We have spoken to Stan Ashby of the Roosevelt Irrigation District (RID) regarding their 36" pipe which crosses our storm drain at approximately 97<sup>th</sup> Avenue. Stan thought that the RID may be willing to outlet this pipe into the proposed Glendale Avenue storm drain at this location. He would have to go to his board to determine if this is an option. Tying the Irrigation into the storm drain would eliminate the need for a significant conflict structure at this location.

I contacted Dan Sherwood (COG) to find out their reaction to this suggestion. His response was positive; however, he suggested that tying a tail water ditch into the storm drain may affect the NPDES. Since the NPDES is not part of our scope of work, we are unaware of the impact of this connection and we would like your input on whether to pursue this option with the RID. Until we hear from you on this issue, we will proceed on the assumption that there will be a conflict structure at this location.

Thank You.

## WOOD/PATEL

Wood, Patel & Associates, Inc.  
1550 East Missouri Ave., Suite 203  
Phoenix, Arizona 85014

# Fax/Memo

<b>To:</b>	R.W. Shobe	<b>From:</b>	James G. Taillon
<b>Fax:</b>	506-8561	<b>Pages:</b>	1
<b>Company:</b>	FCDMC	<b>Date/Time:</b>	06/15/98 10:34 am
<b>Project:</b>	Northern/Orangewood Phll, C	<b>Project #:</b>	94153.06
<b>Re:</b>	36" RID Irrigation Line	<b>CC:</b>	Dan Sherwood COG,File

Urgent     For Review     Please Comment     Please Reply     See Attached

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Thank You.

**FAX TRANSMITTAL**

PAGE 1 OF 2

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

DATE: June 15, 1998

TIME: 10:55 AM

TO: RW Shobe

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase B

JOB NO.: 94153.04

SUBJECT: Potholling Request for Irrigation

COMMENTS:

RW,

Attached is a sketch of the proposed conflict structure for the 36" RID irrigation line at approximately 97<sup>th</sup> Avenue. There will be similar structures at the 24" and 36" irrigation lines at approximately 95<sup>th</sup> and 91<sup>st</sup> Avenues respectively.

Please review this sketch and let us know of any concerns or comments you may have. Since the design of these structures will need to be done by our structural engineer for the 60% submittal, we would like your comments within one week (June 22).

If you have any questions, please let me know.

Thank You.

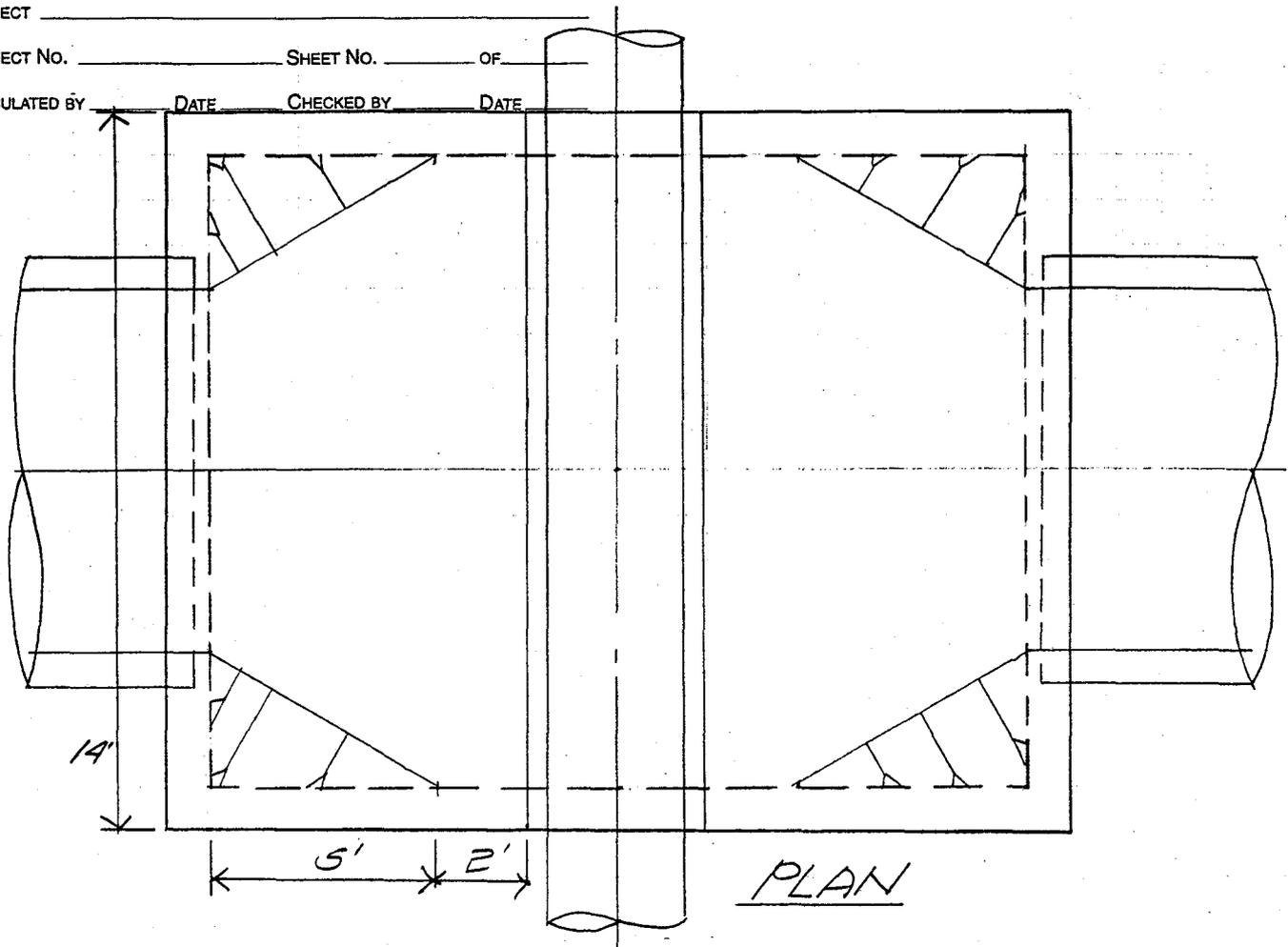
CC: Richard Harris (FCDMC), Dan Sherwood (COG)

Bob Mauer (SRP), File

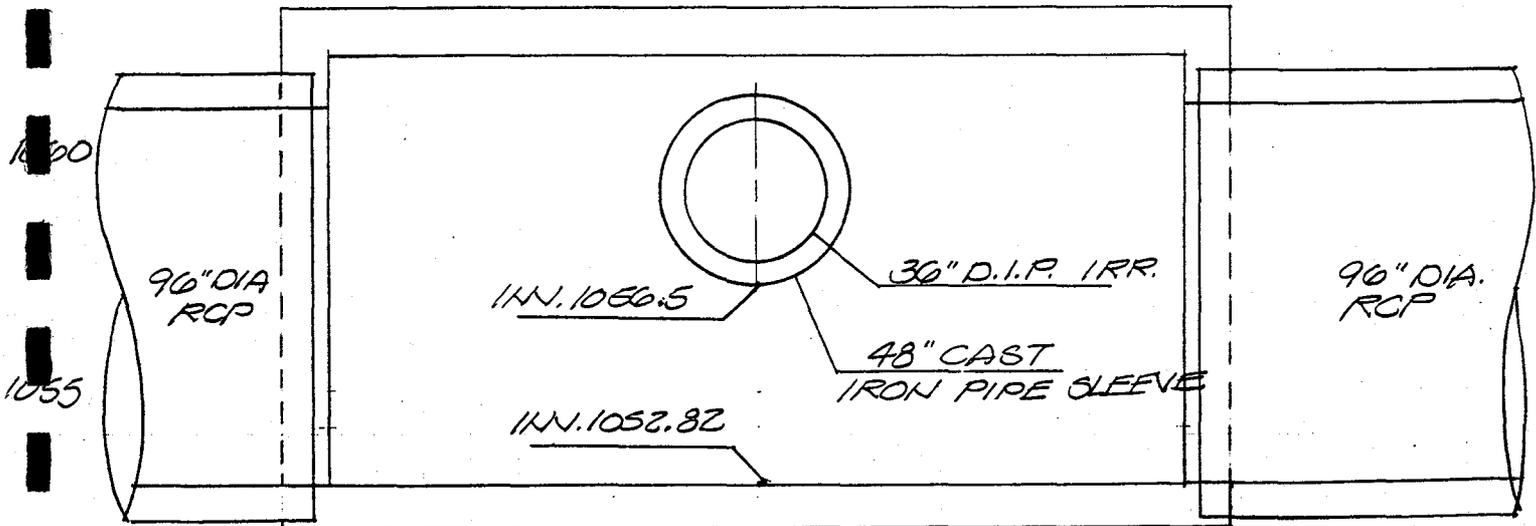
PROJECT \_\_\_\_\_

PROJECT No. \_\_\_\_\_ SHEET No. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY \_\_\_\_\_ DATE \_\_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_



PLAN



PROFILE

Storm Drain/Irrigation Line  
Conflict Structure

Note: Area under Pipe Sleeve is equivalent to  
the Mainline Pipe Diameter

## WOOD/PATEL

Wood, Patel & Associates, Inc.  
1550 East Missouri Ave., Suite 203  
Phoenix, Arizona 85014

# Fax/Memo

<b>To:</b>	R.W. Shobe	<b>From:</b>	James G. Taillon
<b>Fax:</b>	506-8561	<b>Pages:</b>	1
<b>Company:</b>	FCDMC	<b>Date/Time:</b>	06/12/98 9:09 am
<b>Project:</b>	Northern/Orangewood Phil, C	<b>Project #:</b>	94153.06
<b>Re:</b>	Site Access 66 <sup>th</sup> Ave and Frier Dr	<b>CC:</b>	Dan Sherwood COG,File

Urgent     For Review     Please Comment     Please Reply     See Attached

● **Comments:**

In a meeting held at the Flood Control Office on April 2, 1998, Wood /Patel requested permission for access for surveying and potholing for 66<sup>th</sup> Avenue between Orangewood Avenue and Frier Drive and for Frier Drive between 66<sup>th</sup> Avenue and 65<sup>th</sup> Avenue (Pipes 9 and 10). As of this date, we have not received permission for entry. The lack of information in this area is causing a delay in the design of this phase. Please let us know as soon as possible when these areas will be accessible to our crews. Thank you.

**FAX TRANSMITTAL**

PAGE 1 OF 1

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

DATE: June 4, 1998

TIME: 11:04 AM

TO: Richard Harris

COMPANY: FCDMC

FAX NO.: 506-4601

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase B

JOB NO.: 94153.04

SUBJECT: Design Concept and Catch Basin Design

**COMMENTS:**

Richard,

I am sending several attachments for your review and input on this project.

The minutes of the may 27<sup>th</sup> meeting at the city of Glendale gave W/P guidelines for the design of the east and west basins. Based on this meeting, W/P prepared the attached East Basin Design Concept Alternate Analysis.

Alternate C is recommended as the basis of design.

Also attached is a fax memo describing the method to be used for catch basin hydrology.

Please let me know if you have any comments or concerns on either of these issues.

Thank You.

CC: File

# EAST BASIN DESIGN CONCEPT ALTERNATE ANALYSIS

WP #94153.06

June 2, 1998

## ALTERNATE A. Current Concept

The East Basin is designed as an off-line basin. The maximum storage required for a 10-year storm is 150 acre-feet at water surface elevation of 1135.8 ft. The basin also has the capacity to store 100-year storm flows. The maximum available bypass flow is 100 cfs with a total outlet capacity of 130 cfs.

The West Basin is designed as an on-line basin. The maximum storage required for a 10-year storm is 40 acre-feet at water surface elevation of 1123.4 ft. The maximum available bypass flow is 40 cfs with a total outlet capacity of 50 cfs.

### Pros:

1. The East Basin can store all inflow from a 10-year storm.
2. The East Basin can handle 100-year flows from all drainage areas directly draining to the basin with the exception of Grand Avenue flow.
3. The East Basin can provide a better drainage characteristics for Grand Avenue for short duration storm. This may be in excess of the 10-year frequency event.
4. Approximately 100 cfs will bypass the basin. As a result, all initial nuisance flow will be diverted away from the basin. This option will help keep the majority of yearly rainfall events in the pipe. As a result, maintenance of the basin will be significantly reduced. In addition, the use of the basin as a park/recreation facility will be positively impacted.

### Cons:

1. A mechanical gate is required. The District probably can provide maintenance and operation assistance. The operation aspect of the gate can be simplified by adding an electronically operated gate. Since the gate opening could occur anytime after the storm event has passed, backup power is not critical and may not be needed.
2. A flap gate is required. Although the gate will operate automatically, occasional maintenance will be required.

## ALTERNATE B. East Basin Online - 82 cfs Total Outlet Capacity

The East Basin is designed as an on-line basin. The maximum storage required for 10-year storm is 170 acre-feet at water surface elevation of 1140 ft. The maximum available bypass flow is 42 cfs with a total outlet capacity of 82 cfs.

West Basin is designed as an on-line basin. The maximum storage required for 10-year storm is 70 acre-feet at water surface elevation of 1122.3 ft. The maximum available bypass flow is 40 cfs with a total outlet capacity of 50 cfs.

### Pros:

1. No mechanical gate or flap gate is required. The maintenance and operational aspects of gates are not needed.
2. Storm drain pipe sizes between East Basin and West Basin can be slightly reduced.
3. Approximately 42 cfs will bypass the basin before it begins to fill. As a result, all initial nuisance flow will be diverted away from the basin. This option will help keep the majority of yearly rainfall events in the pipe. As a result, maintenance aspect of the basin will be significantly reduced. In addition the use of the basin as a park/recreation facility will be positively impacted.

### Cons:

1. The East Basin capacity to handle 10-year flows from Grand Avenue will be significantly reduced.
2. The East Basin will not be able to handle any excess flow for the storms larger than the 10-year event.
3. The West Basin area requirement increases from 9 acres to 18 acres.

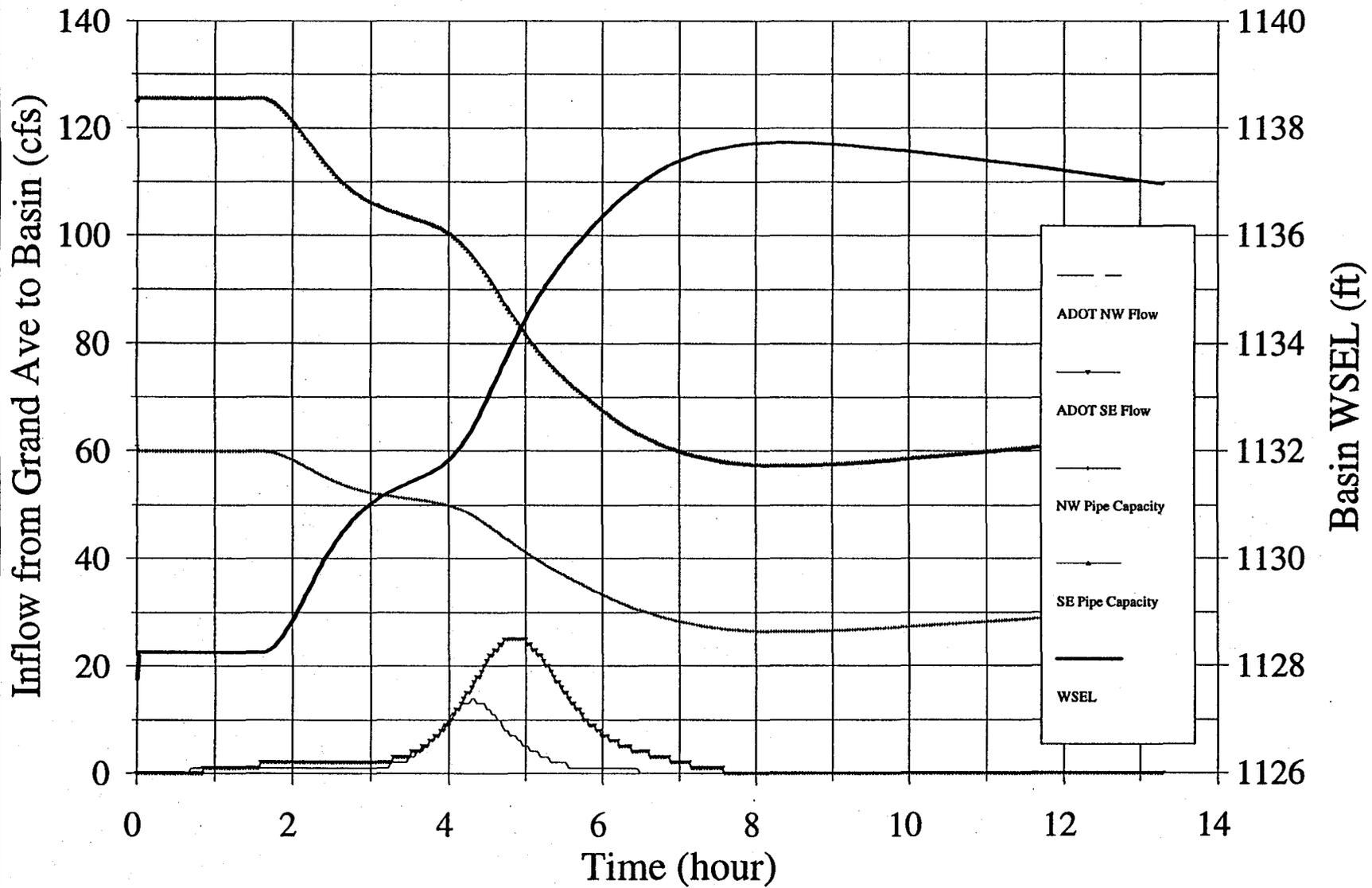
MISCeast-basin-design-concept-may20

## SUMMARY OF COST

Alternate	East Basin		West Basin		Total		
					Cost*	Area (Ac)	Earthwork
	Area (acres)	Vol (CY)	Area (acres)	Vol (CY)	Phases II "B" & "C"	Ac	Vol (CY)
A. Current Concept	30	613,000	9	136,000	\$ 9,196,000	39	749,000
B. Revision per COG	30	484,000	18	286,000	\$ 9,109,000	48	770,000
C. Revision per COG	38	657,000	20	233,000	\$9,290,000	58	890,000

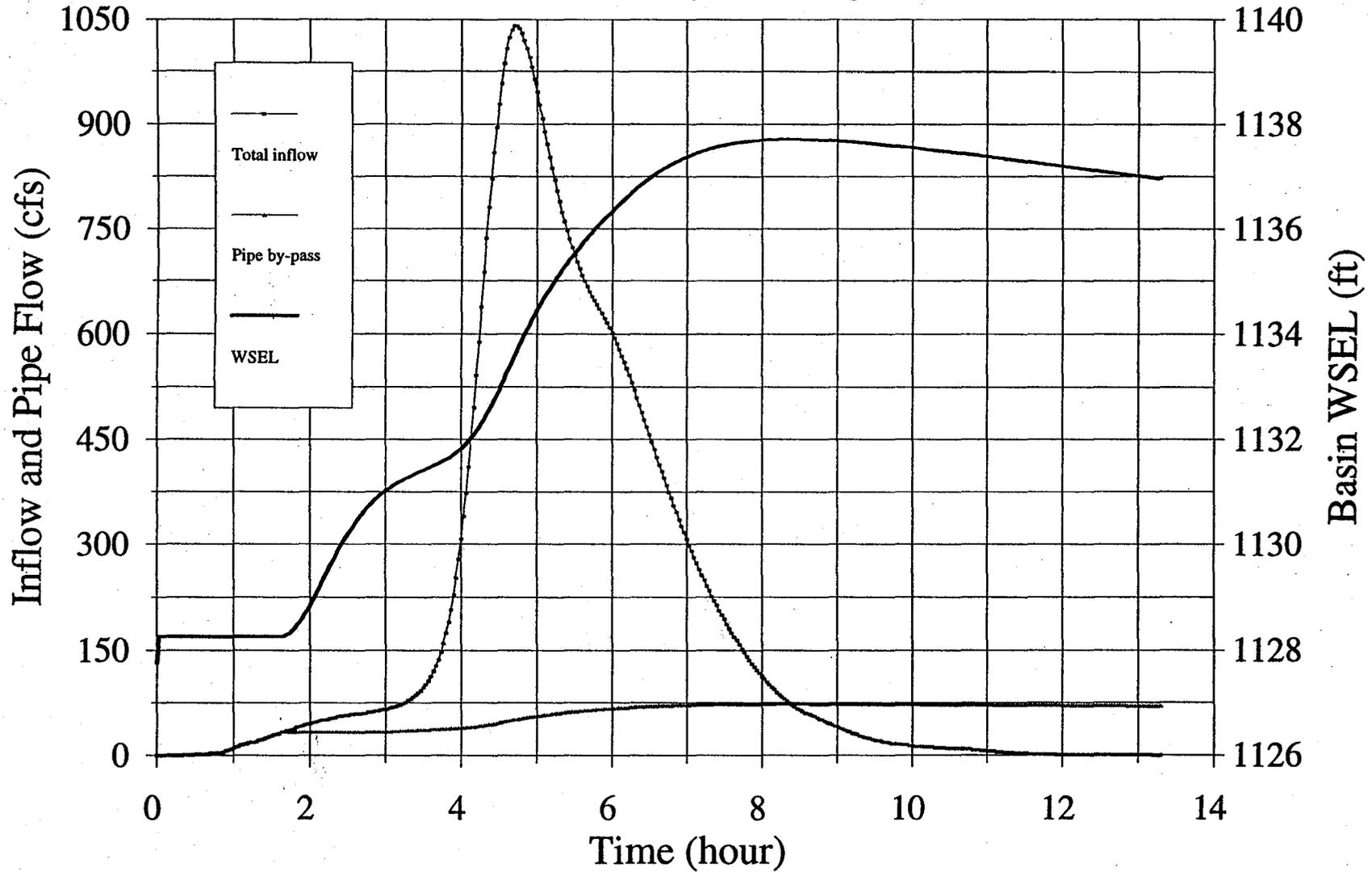
**\*Note:** The increased land requirement for West Basin was not taken into account in the cost comparison. The earthwork cost estimates for options B & C take into account ADOT participation for excavation (\$3/cy w/o ADOT and \$1.50/cy w/ADOT).

# Northern Oranewood Phase II East Basin - Grand Ave. Simulation

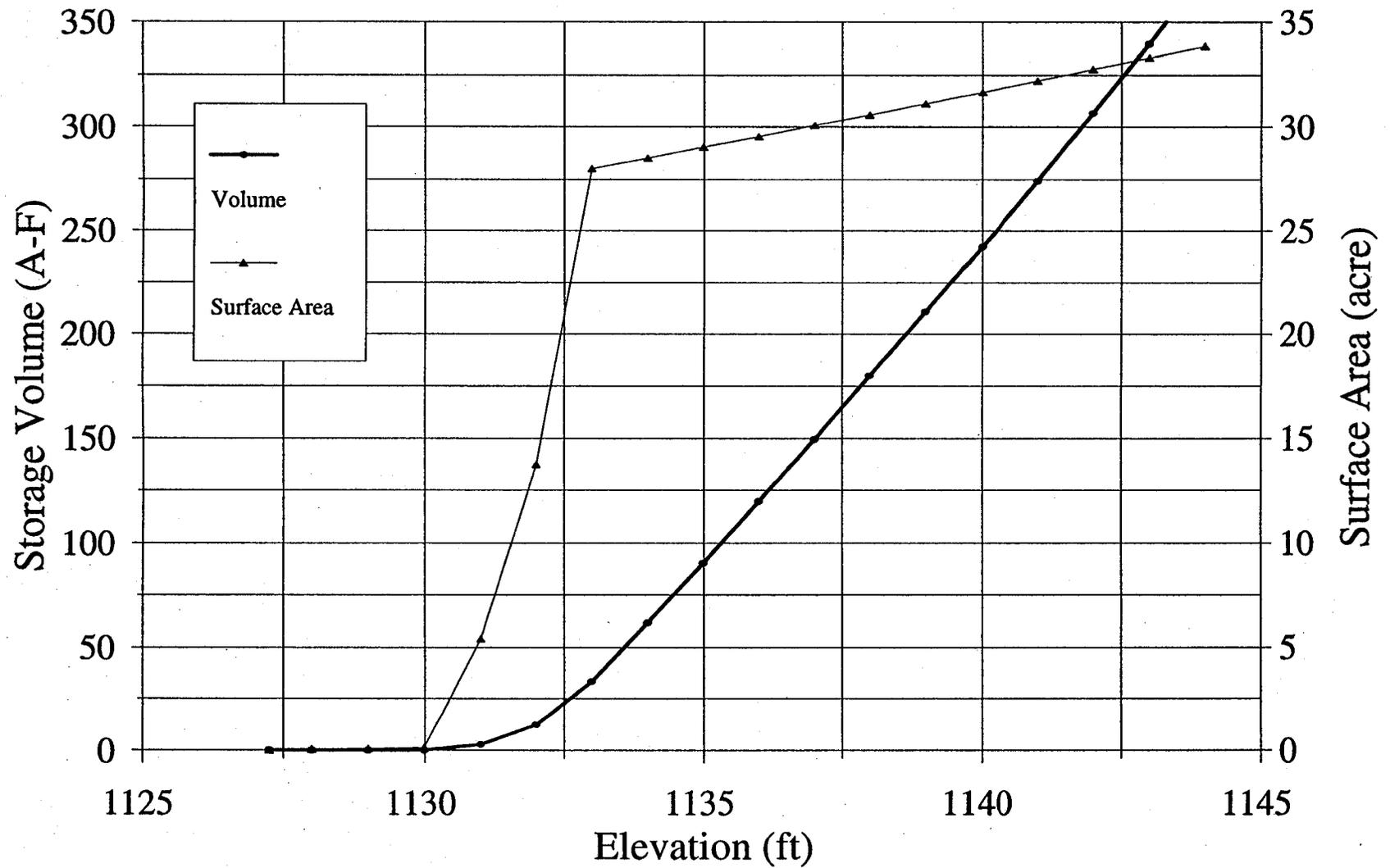


# Northern Oranewood Phase II

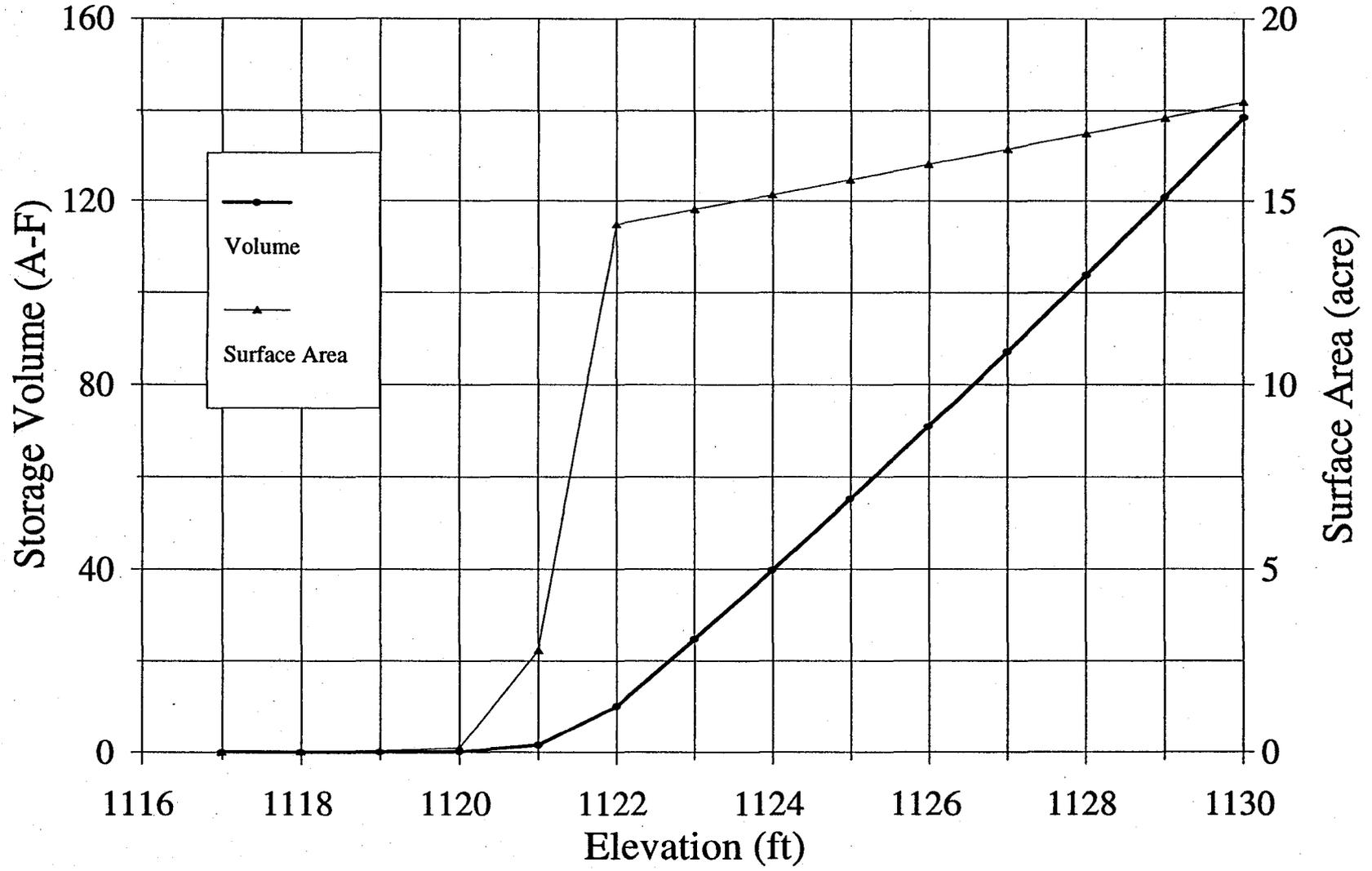
## East Basin - 10-year design flow



# Northern Oranewood Phase II E-Basin Storage-Elevation-Area Curves



# Northern Oranewood Phase II W-Basin Storage-Elevation-Area Curves



## WOOD/PATEL

Wood, Patel & Associates, Inc.  
1550 East Missouri Ave., Suite 203  
Phoenix, Arizona 85014

# Fax/Memo

<b>To:</b>	R.W. Shobe	<b>From:</b>	James G. Taillon
<b>Fax:</b>	506-8561	<b>Pages:</b>	1
<b>Company:</b>	FCDMC	<b>Date/Time:</b>	06/04/98 10:48 am
<b>Project:</b>	Northern/Orangewood Phll, B	<b>Project #:</b>	94153.04
<b>Re:</b>	Catch Basin Hydrology	<b>CC:</b>	Richard Harris (FCDMC), File

Urgent     For Review     Please Comment     Please Reply     See Attached

● **Comments:**

Wood/Patel has discussed the catch basin inlet design with RW Shobe to determined how flows contributing to the basins would be quantified. The following is a summary of that conversation for your input and/or concurrence:

The flows generated from the HEC-1 model which was prepared for the Northern/Orangewood Concept Routing Study will be used to design the inlets at the major intersections and concentration points for catch basin sizing. The City of Glendale has requested catch basins at 1/8<sup>th</sup> mile street alignments. In order to design these basins, the rational method will be used to determine contributing flows from the local drainage areas using the FCDMC Rational.exe program. If you have any comments or concerns on this issue, please let me know. Thank You.

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 1

DATE: June 2, 1998

TIME: 10:39 AM

TO: RW Shobe

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase C

JOB NO.: 94153.06

SUBJECT: Potholling Request for Irrigation

COMMENTS:

RW,

Since we will not be allowed to realign the irrigation lines which are in conflict with the profile of the proposed storm drain line, we will need to pothole the following irrigation lines as soon as possible to determine if conflict structures will be required at the following locations:

- ✓ 1) Sta. 13+26, 33' rt - 36" RID Irrigation Line
- ✓ 2) Sta. 26+95, 33' rt - 24" RID Irrigation Line
- ✓ 3) Sta. 52+20, 29' rt - 12" RID Irrigation Line
- ✓ 4) Sta. 52+43, 29' rt - 36" SRP Irrigation Line
- ✓ 5) Sta. 53+45, 29' rt - 24" RID Irrigation Line
- ~~6) Sta. 106+29, 21' rt - 18" RID Irrigation Line~~
- ~~7) Sta. 105+90, 50' lt - 18" RID Irrigation Line~~

Please let me know if you have any comments or concerns.

CC: File

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 1

DATE: May 28, 1998

TIME: 8:27 AM

TO: Brian Roche

COMPANY: Contech

FAX NO.: 935-6100

FROM: James Taillon

PROJECT: Northern/Butler Storm Drain

JOB NO.: 94153.04

SUBJECT: Contech HEL-COR CL Information

**COMMENTS:**

Brian,

As you may recall, in our discussion of May 12<sup>th</sup> I requested prices for HEL - COR CL fittings for the Glendale Avenue Storm Drain. The following is a list of fittings which we anticipate:

5 - 108" x 108" x 18" Tee

1 - 108" x 108" x 24" Tee

4 - 108" x 108" x 36" Tee

2 - 96" x 96" x 18" Tee

13 - 90" x 90" x 24" Tee

1 - 90" x 90" x 36" Tee

Any help you can provide for the pricing of these items would be appreciated.

Thank you for your assistance in this matter.

James Taillon

CC: File

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 2

DATE: May 26, 1998

TIME: 10:12 AM

TO: Guy Romreo

COMPANY: Horizontal Boring and Tunneling

FAX NO.: 237-4188

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase C

JOB NO.: 94153.06

SUBJECT: Storm Drain Boring at Railroad

COMMENTS:

Guy,

Wood/Patel has contracted with the Flood Control District of Maricopa County to prepare storm drain plans which will cross the Burlington Northern and Santa Fe Railroad at 65<sup>th</sup> Ave and Grand Ave. Jim Campbell of our office has worked with your company before and suggested that I contact you for some help in preparing an application for permit from the railroad. On the attached permit form I have identified the items which I would like some direction on.

Please give me a call once you've had a chance to review this so we can discuss your input.

Thank you,

James Taillon

CC: File

Date: \_\_\_\_\_

### APPLICATION FOR PIPE LINE CROSSING OR LONGITUDINAL

Permit Services  
Cellus Management Corporation  
4545 Fuller Drive, Suite 105  
Irving, TX 75038

APPLICANT'S TAX I.D. NO./SS# \_\_\_\_\_

ATTN: Patricia Foster

We submit for your approval the following specifications for a pipe line we propose to build across THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY right-of-way, as shown on enclosed sketch.

Local name of company or municipality who will own the pipeline Flood Control District of Maricopa County

State in which incorporated Arizona

If not incorporated, correct name of owners or all partners: \_\_\_\_\_

Correct mailing address 2801 W. Durango Street Zip Code 85009

Type of Encroachment: Crossing  Longitudinal  Telephone 506-4603

Location of encroachment NW 1/4 Sec 6 Twsp 2N Rng 2E MP \_\_\_\_\_ + \_\_\_\_\_

Name of nearest town on Railroad Glendale County Maricopa State Arizona

Name of nearest roadway crossing Railroad 67th Avenue

Within limits of public road or street  Yes  No If yes, distance from center line of road or street \_\_\_\_\_ ft.

Contents to be handled through pipe	<u>CARRIER</u>	<u>CASING</u>
Length of pipe on Railroad Co. property	<u>Storm Water</u>	

Plastic pipe must be encased full width of right of way 83 ft. 83 ft.

Inside diameter of pipe 60 in. \_\_\_\_\_ in. ?

Pipe Material \_\_\_\_\_ ?

Specification & grade (Min. yield strength casing 35,000 psi.) \_\_\_\_\_ ?

Wall Thickness \_\_\_\_\_ in. \_\_\_\_\_ in. ?

(Min. wall thickness of casing pipe under 14 in.-0.188 in. E-80 Loading) \_\_\_\_\_ psi

Annual working pressure \_\_\_\_\_ psi

Type of joint - (mechanical or welded type) \_\_\_\_\_ ?

Longitudinal Joint Factor \_\_\_\_\_ ?

Casting \_\_\_\_\_ ?

Distance Base of rail to top of pipe 12'

(Flammable, contents, steam, water or non-flammable - min. 5 1/2 ft. under main track.)

(Encased, gaseous products - min. 10' under track)

Minimum ground cover on Railroad Co. property (min. 3 ft.) \_\_\_\_\_ ?

Cathodic protection casing-(flammable substance) \_\_\_\_\_ ?

Type of insulators or supports \_\_\_\_\_

Number of vents \_\_\_\_\_ Size \_\_\_\_\_ Height above ground \_\_\_\_\_

(Flammable substances require 2 vents)

Method of crossing: Jacking  Trench \_\_\_\_\_ Dry Bore Only \_\_\_\_\_

(If trenched - Railroad furnish flagman at applicant's expense.)

(If bored or jacked - Jacking Pit location minimum 30 ft. from centerline of nearest track.) Pit must not be open more than 48 hours.

Also, it must be protected when not in use.

Does pipeline support oil or gas well?  Yes  No

If yes, advise distance the well is from Railway property - \_\_\_\_\_ ft. Name of well \_\_\_\_\_

Attached to this sheet is location plan and detail sketch. Sketch shows tie-down measurement to centerline of nearest road crossing, bridge or other railroad structure. Please authorize us to proceed with this installation or advise what changes are necessary to meet your specifications.

Signed: \_\_\_\_\_  
Title: Project Manager  
Telephone: (602) 506-4603

**FAX TRANSMITTAL**

PAGE 1 OF 2

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

.....  
DATE: May 18, 1998  
.....

.....  
TIME: 8:41 AM  
.....

**TO: Stan Ashby**

.....  
**COMPANY: Roosevelt Irrigation District**

.....  
**FAX NO.: 386-4360**

.....  
**FROM: James Taillon**

.....  
**PROJECT: Northern/Orangewood Ph II, Sub-phase B**

**JOB NO.: 94153.04**

.....  
**SUBJECT: Glendale Avenue Storm Drain**

.....  
**COMMENTS:**

.....  
Stan,

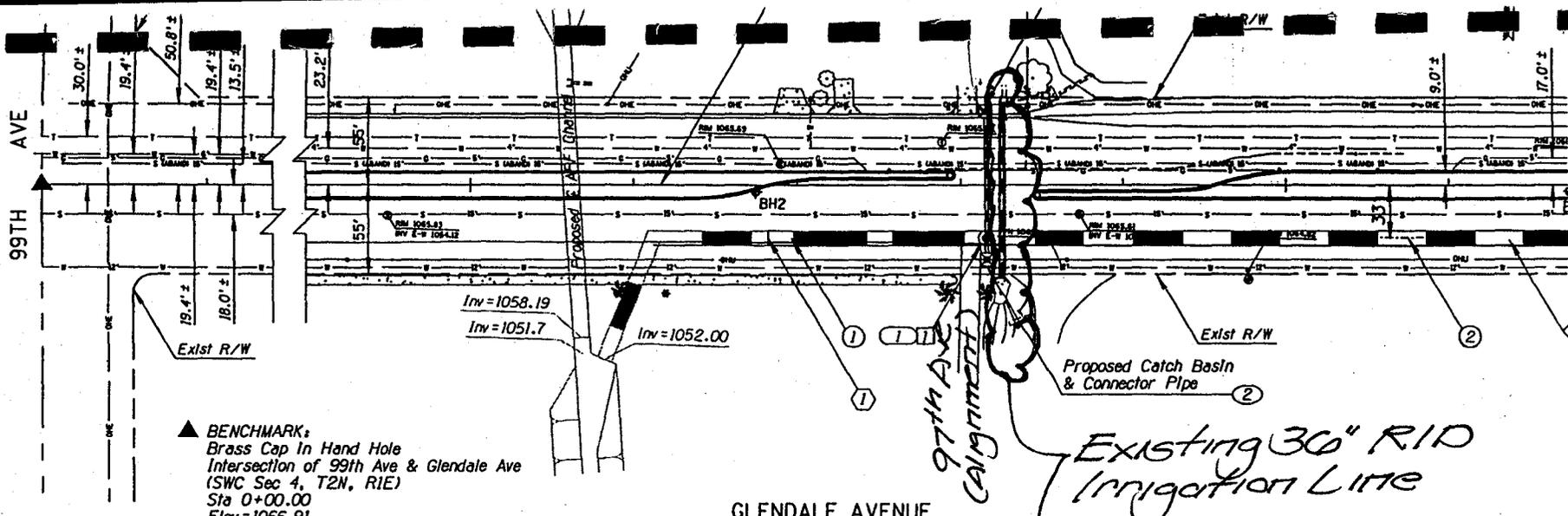
.....  
As discussed this morning, we are in the process of designing a storm drain  
.....  
for the Flood Control District and the City of Glendale in Glendale Ave from the future  
.....  
Agua Fria Freeway to 83<sup>rd</sup> Ave.

.....  
I have attached a sketch of the proposed Glendale Ave Storm Drain at 97<sup>th</sup> Ave.  
.....  
As shown, there is a conflict with your 36" Irrigation line at this location. We would like  
.....  
to dip (siphon) the irrigation under the proposed storm drain to resolve the conflict.

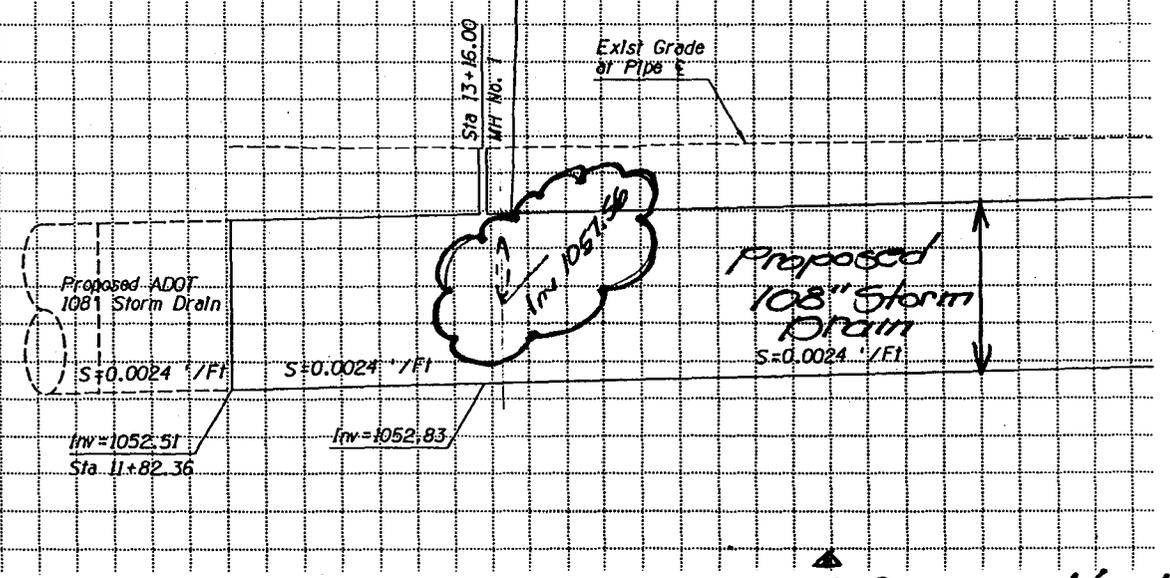
.....  
After you've had a chance to review the plan, please give me a call so that we  
.....  
can discuss the possible conflict resolutions.

.....  
Thank you,  
.....  
James Taillon

.....  
CC: File



North  
1" = 100'



99th Ave & Glendale Ave  
RID & Storm Drain Vertical  
Conflict

Wood/Partel  
234-1344  
5/18/98  
HP#94153.04

**WOOD/PATEL**

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

Wood, Patel & Associates, Inc.  
1550 East Missouri, Suite 203  
Phoenix, Arizona 85014  
(602) 234-1344  
FAX 234-1322

**LETTER OF TRANSMITTAL**

DATE	5/13/98	JOB NO.	94153.04
ATTENTION	DAVE SCHWAB		
RE:	N/O PHIL "B" Glendale Ave Storm Drain		

TO BRW

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings
- Prints
- Plans
- Samples
- Specifications
- Copy of letter
- Change order
- \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1		1	Sheet 0 of 16 Connection @ AFF outfall chan.
1		3	HEC-RAS OUTPUT @ Glendale Ave
1		3	Horizontal Control Dwg's

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- As requested
- For review and comment
- FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_
- Approved as submitted
- Approved as noted
- Returned for corrections
- \_\_\_\_\_
- Resubmit \_\_\_\_\_ copies for approval
- Submit \_\_\_\_\_ copies for distribution
- Return \_\_\_\_\_ corrected prints
- PRINTS RETURNED AFTER LOAN TO US

REMARKS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COPY TO \_\_\_\_\_

SIGNED: James Tailon

If enclosures are not as noted, kindly notify us at once.

**woodpatl**

---

From: woodpatl <woodpatl@netzone.com>  
To: David Schaub <dscha@brwphx.com>  
Subject: Northern/Orangewood Project Glendale Avenue Storm Drain  
Date: Wednesday, May 13, 1998 10:45 AM

Dave,

Attached is a copy of the microstation file for sheet 6 of 16 for your use. If you need any additional information, please let me know.

Thank you,  
James Taillon

**FAX TRANSMITTAL**

PAGE 1 OF 2

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

DATE: May 13, 1998

TIME: 10:17 AM

TO: David Schaub

COMPANY: BRW

FAX NO.: 230-9189

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase B

JOB NO.: 94153.04

SUBJECT: ADOT/City of Glendale Datum Equation

COMMENTS:

David,

As requested, I am sending you the datum equation for the Glendale Storm Drain. I will E-mail you a microstation copy of our sheet 6 of 16 today. If you have any questions or require additional information, please let me know.

Thank you,

James Taillon

CC: File

**NORTHERN/ORANGEWOOD STORM DRAIN PROJECT**  
**Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue**  
**Phase II, Sub-Phase B**  
**Flood Control District of Maricopa County**

May 13, 1998

Contract FCD 94-12  
 PHASE II  
 Sub-phase "B"  
 W/P # 94153.04

**ADOT/COG Datum Comparison**

Location and Description	Point Number		Elevation		Elevation Differential
	ADOT	Wood/Patel	ADOT	Wood/Patel	
Brasscap Flush Glendale Ave and 99th Avenue	102	14	1066.93	1066.91	-0.02
PK Nail 350' +/- west of 99th Ave and Glendale Avenue	206	206	1068.10	1068.07	-0.03
PK Nail 1326' +/- east of 99th Ave and Glendale Avenue	208	18	1065.67	1065.62	-0.05

Average Differential: -0.033

***Datum Equation: ADOT Elevation Minus 0.033' Equals Wood/Patel Elevation***

Note: Wood/Patel Datum provided by the City of Glendale

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 2

DATE: May 12, 1998

TIME: 9:28 AM

TO: Angie Hardesty

COMPANY: Cox Communications

FAX NO.: 892-6069

FROM: James Taillon

PROJECT: Glendale Ave Storm Drain

JOB NO.: 94153.04

SUBJECT: 30% Review Meeting

COMMENTS:

CC: File

**woodpatl**

---

From: woodpatl <woodpatl@netzone.com>  
To: Daryl Smith <dkSmith@srp.gov>; Bob Maurer <btMaurer@srp.gov>; Dan Sherwood <Sherwood@ci.Glendale.az.us>; Robert Sprague <DominiqueMitchell@swgas.com>; Robert Friess <rfriess@uswest.com>  
Cc: RW Shobe <rws@mail.maricopa.gov>  
Subject: Northern/Orangewood Phase II "B" 30% Review Meeting  
Date: Tuesday, May 12, 1998 9:13 AM

The 30% Review Comment Meeting for this project will be held at the Flood Control District of Maricopa County (2801 W. Durango, Phoenix - Ph.# 506-1501) this Thursday, May 14th at 9am. Please plan on attending if you have any comments or concerns which will need to be addressed.

Thank You,  
James Taillon

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 4

DATE: May 7, 1998

TIME: 8:25 AM

TO: Barry Larson

COMPANY: City of Glendale

FAX NO.: 915-2689

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase C

JOB NO.: 94153.06

SUBJECT: Storm Drain Profile

COMMENTS:

Barry,

As discussed yesterday morning, I would like to lower the Storm Drain invert at Glendale Ave and 83<sup>rd</sup> Ave to avoid a conflict with the 72" Storm Drain and the 15" sanitary sewer in 83<sup>rd</sup> Ave. I would like to lower the Storm Drain 1'. This will require the water line dip to be lowered 1' as marked up on the attached sheets.

Please give me a call if you have any questions.

Thank you.

CC: File

18" D.I.P.  
M.J.  
058'/'

SIA. 60+70  
GRADE BREAK

105 L.F. 18" D.I.P. R.J.-M.J.  
@ S = -0.0392'/'  
0.04876

STA. 61+75  
GRADE BREAK

102 L.F. 18" D.I.P., R.J.-M.J.  
@ S = 0.00133'/'

STA. 62+74

61

62

8372  
OK

Inv. =  $\frac{79.69}{78.60}$

1082.9  
E.W.

Prop. 84" SD  
Inv. = 88.908

7" SD

El. = 88.24

EXIST.  
El. = 90.35

EXIST.  
El. = 90.0

EXIST.  
El. = 89.0

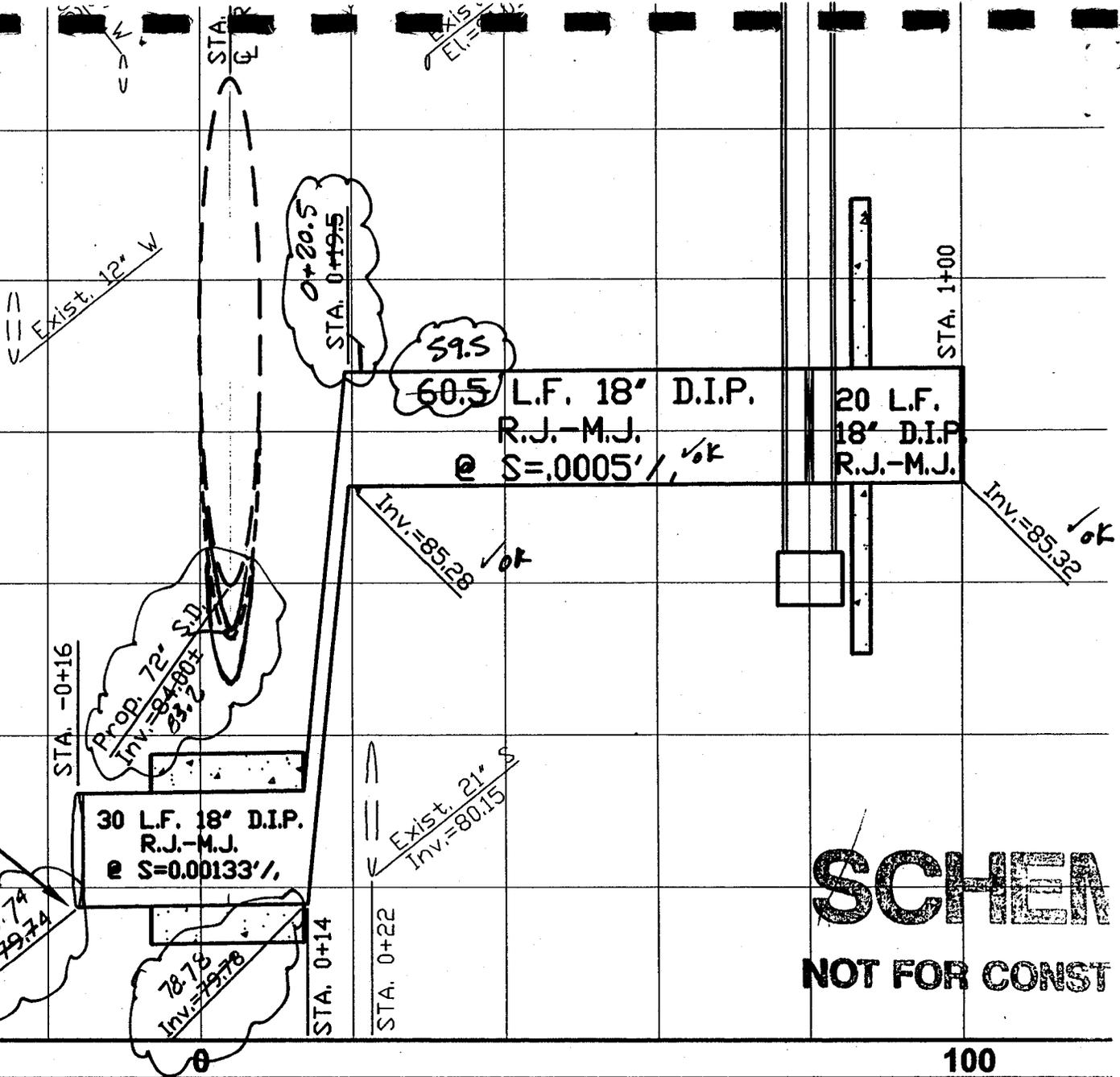
EXIST.  
El. = 90.0

EXIST. (A.C.P.)

EXIST.

4165

-MATCH POINT



**SCHEM**  
**NOT FOR CONST**

100

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 1

DATE: May 7, 1998

TIME: 9:05 AM

TO: Brian Roche

COMPANY: Contech

FAX NO.: 935-6100

FROM: James Taillon

PROJECT: Northern/Butler Storm Drain

JOB NO.: 94153.04

SUBJECT: Contech HEL-COR CL Information

COMMENTS:

Brian,

Thank you for the information you provided in your Fax of April 7.

I was wondering if you could give me some estimates for several laterals for this project. We have approximately 185 lf of 72" Storm Drain and 114 lf of 66" Storm Drain. I would also like to talk to you about the availability of prefabricated fittings for this project. Please give me a call when you get a chance.

Thank you for your assistance in this matter.

CC: File

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 4

DATE: May 5, 1998

TIME: 10:51 AM

TO: RW Shobe

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub-phase C

JOB NO.: 94153.06

SUBJECT: Correspondence for your file

COMMENTS:

CC: File

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: May 5, 1998	JOB NO. 94153.06
ATTENTION: John Palmieri	
RE: Northern/Orangewood Storm Drain	
Orangewood Avenue Storm Drain Sub-Phase C	
Soil Boring Locations	

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Bluelines     Specifications
- Copy of letter     Drainage Report     Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1			Full Size Bluelines with Soil Boring Locations

THESE ARE TRANSMITTED as checked below:

- For approval                       Approved as submitted                       Approved as noted
- For your use                               As requested                                       For review and comment

REMARKS:

COPY TO: Project File, RW Shobe - FCDMC

SIGNED: James Taillon

**WOOD/PATEL**

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

Wood, Patel & Associates, Inc.  
1550 East Missouri, Suite 203  
Phoenix, Arizona 85014  
(602) 234-1344  
FAX 234-1322

**LETTER OF TRANSMITTAL**

DATE	4/30/79	JOB NO.	7453.04
ATTENTION	Doug Eath		
RE:	Glendale Ave. Storm Drain		

TO Coe & Van Loo

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings
- Prints
- Plans
- Samples
- Specifications
- Copy of letter
- Change order
- \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4/98		30% plans Glendale Ave. Storm Drain Northern/Orange Grove Project

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- As requested
- For review and comment
- FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_
- Approved as submitted
- Approved as noted
- Returned for corrections
- Resubmit \_\_\_\_\_ copies for approval
- Submit \_\_\_\_\_ copies for distribution
- Return \_\_\_\_\_ corrected prints
- PRINTS RETURNED AFTER LOAN TO US

REMARKS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COPY TO R.W. Shobe P.E., F.G.M.C.

SIGNED: [Signature]

If enclosures are not as noted, kindly notify us at once.

# WOOD/PATEL

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

Darrel E. Wood, P.E., R.L.S.  
Ashok C. Patel, P.E., R.L.S.  
James S. Campbell, P.E.  
Gordon W. R. Wark, P.E.  
Thomas R. Gettings, R.L.S.  
Bruce Friedhoff, P.E.  
Scott A. Nelson, R.L.S.  
Richard L. Hiner, P.E.  
Fredrick K. Schneider, P.E.  
Timothy A. Huval, P.E.  
Michael J. Sexton, R.L.S.  
Jack K. Moody, P.E.  
Leslie J. Kland, P.E.  
Carl Sitterley, R.L.S.  
Curtis L. Brown, P.E.

April 29, 1998

City of Glendale  
5850 West Glendale Avenue  
Glendale, AZ 85301

Attn: Mr. Dan Sherwood, P.E.

Re: **Northern/Orangewood Storm Drain Project**  
Contract FCD 94-12 Phase II  
Glendale Avenue Storm Drains, Sub-Phase "B"  
WP #94153.04

Dear Mr. Sherwood:

As per Mr. R.W. Shobe, P.E., FCDMC's direction, we are pleased to submit this data package in conjunction with the 30% plan submittal for the referenced project. The package includes:

- Full size set of plans (blueprints) - 1 set (under separate cover)
- Half size set of plans (photocopy) - 1 set (under separate cover)
- Design Report including Design Calculations - 1 set
- Cost Estimates - 1 set (included in report)
- Geotechnical Report - 1 set (under separate cover)

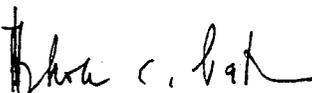
Please note that our design report includes design calculations appropriate for the 30% submittal. We intend to provide more detailed calculations in our 60% submittal.

Per FCDMC direction, the 30% review response meeting is scheduled on May 14, 1998 at 9:00 a.m. at FCDMC office. Please have your review completed and comments available for discussion at this meeting.

Please feel free to call if you have any questions.

Sincerely,

**WOOD, PATEL & ASSOCIATES, INC.**

  
Ashok C. Patel, P.E., R.L.S.  
Project Manager

ACP/ct

cc: Mr. R.W. Shobe, P.E., Flood Control District of Maricopa County

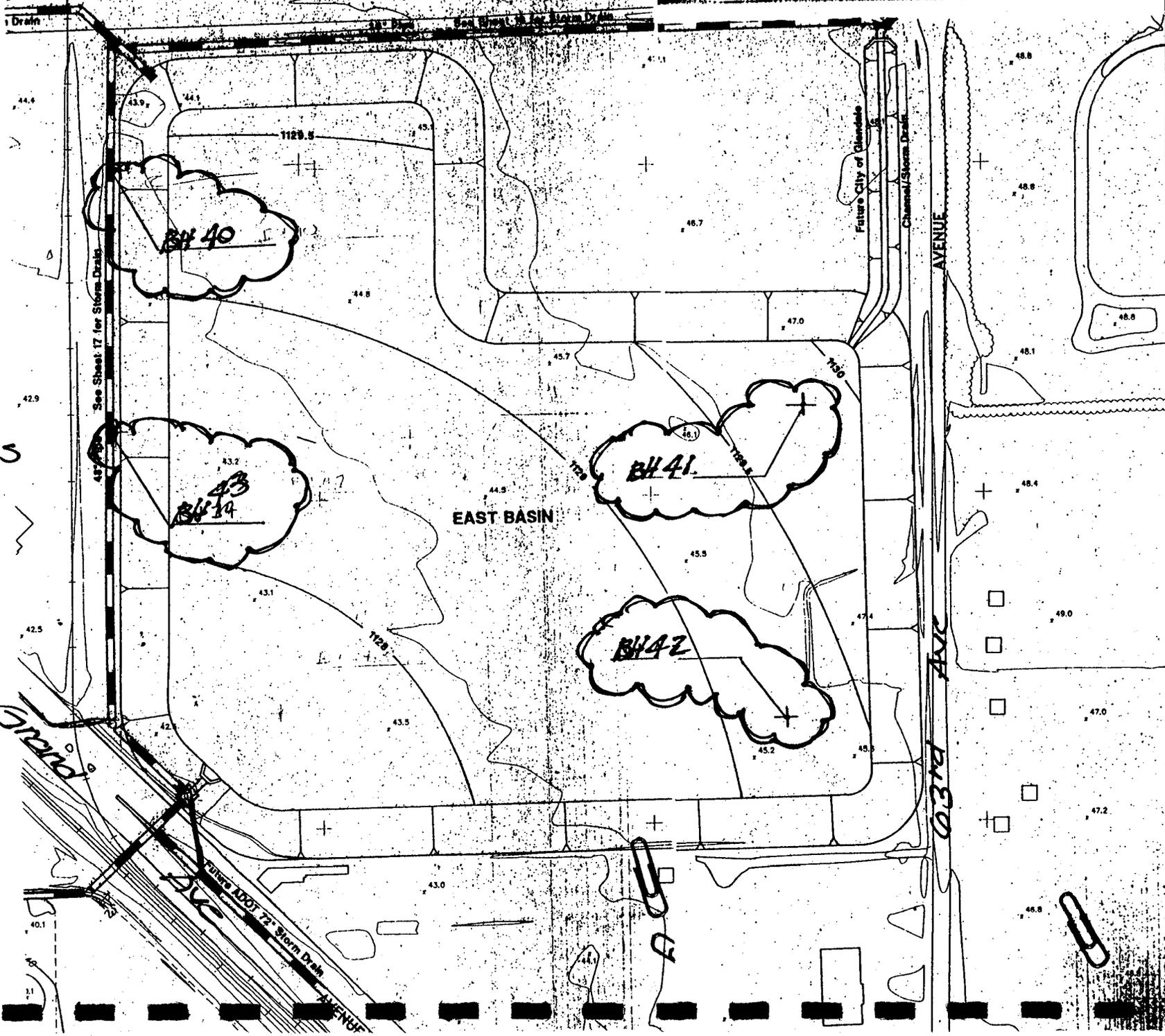
Enclosures

GENCOR\94153\cityofglendale.wpd



NORTH

1127.7



N  
1" = 200'

East Basin  
Boring Holes  
40 thru 43

Gravel

Future 400' Storm Drain

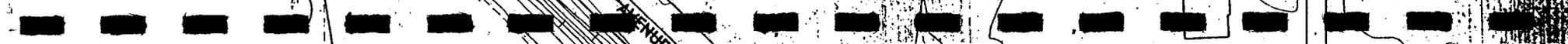
Future City of Glendale  
Channel/Storm Drain

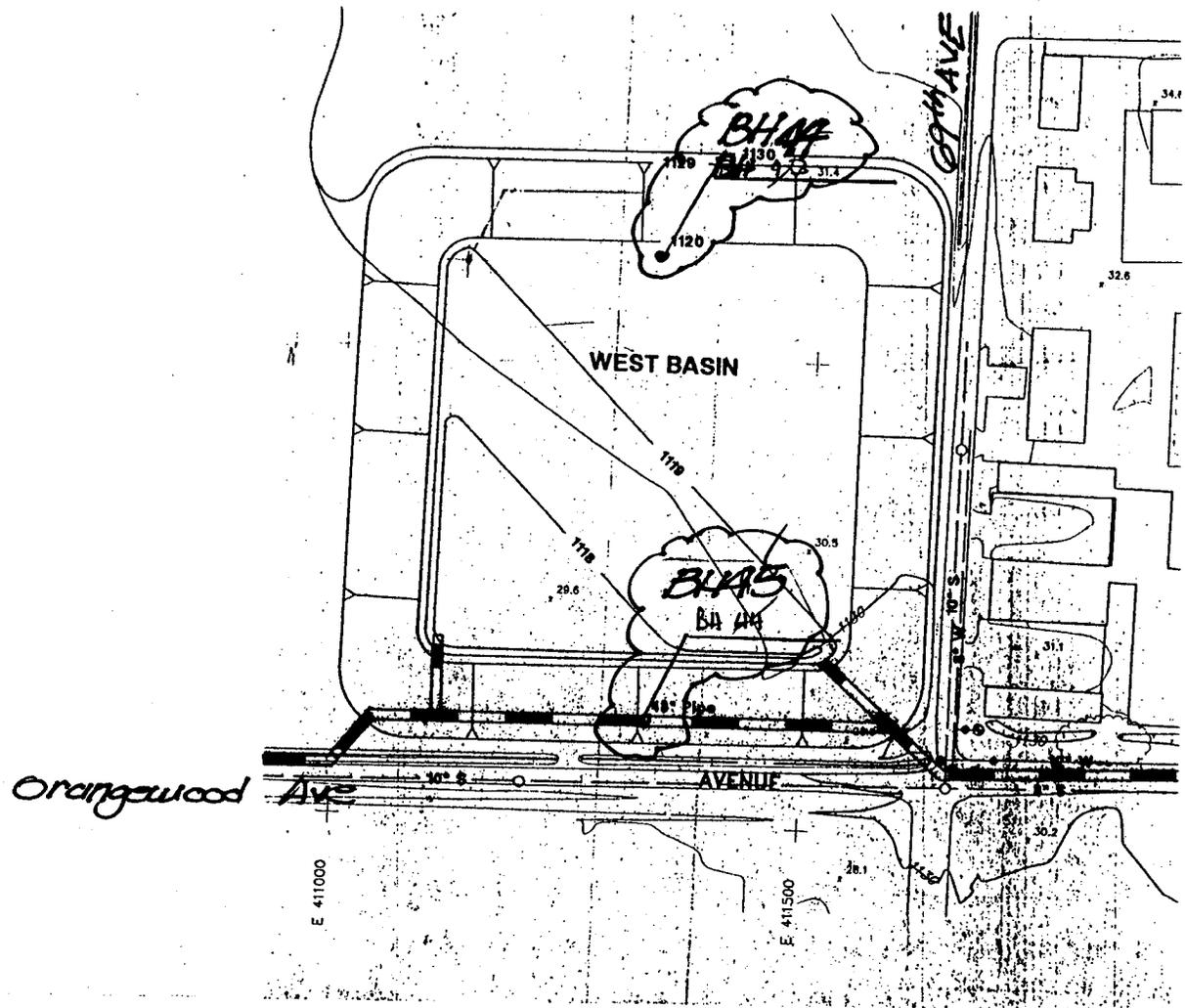
037th AVE

EAST BASIN

Drain

See Sheet 17 for Storm Drain





West Basin Boring Hole #44d45



R·A·M

RICKER • ATKINSON • McBEE & ASSOCIATES, INC.

*Geotechnical Engineering • Construction Materials Testing*

Wood, Patel & Associates  
1550 E. Missouri, Suite 203  
Phoenix, Arizona 85014

January 20, 1998

Attention: Ashok Patel, P.E.

Subject: Geotechnical Engineering Report  
Northern/Orangewood Storm Drain Project  
Phase II  
99th Avenue to 83rd Avenue  
Glendale, Arizona

R.A.M. Project No. G01522  
Report No. 2

Attached to this letter is the Geotechnical Engineering Report for the proposed Northern/Orangewood Storm Drain Project to be located in Glendale, Arizona.

The proposed project will include two miles of storm drain along Glendale Avenue from 99th Avenue to 83rd Avenue. The results of our field exploration; laboratory testing; and engineering analysis, evaluation and recommendations are presented in the report.

The following is a brief summary of selected recommendations.

A. Site Soils:

- Use as fill in pavement areas.

B. Replacement Pavement:

- If existing pavements are to be replaced in kind, then the minimum section should be 8 inches of asphalt concrete on 9 inches of base material.
- If based on City of Glendale design procedure, a pavement section of 4 inches of asphalt concrete on 12 inches of base material is required.

The attached report was prepared based on project and site data available at this time and was prepared in a manner and to the standards of the local geotechnical engineering practice. Our services did not include evaluations for the presence of hazardous materials, for area subsidence resulting from groundwater withdrawal or other geologic hazards.

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: April 28, 1998

JOB NO. 94153.04

ATTENTION: RW Shobe

RE: Northern/Orangewood Storm Drain

Glendale Avenue Storm Drain Sub-Phase B

30% Submittal

WE ARE SENDING YOU ● Attached ○ Under separate cover via PICK-UP the following items:

- Conceptual drawings    ● Design Plans (11x17)    ● Plans (Full Size)    ○ Bluelines    ○ Specifications
- Copy of letter    ● Drainage Report    ● Other : See Below

COPIES	DATE	NO.	DESCRIPTION
6		16	Full Size 30% Plans
2		16	Half Size 30% Plans
6		1	Drainage Report with Hydraulic Calcs (diskette) and Cost Estimate
1		1	Copy of Correspondence
5		1	Geotechnical Report

THESE ARE TRANSMITTED as checked below:

- For approval    ○ Approved as submitted    ○ Approved as noted
- For your use    ○ As requested    ● For review and comment

REMARKS:.


COPY TO: Project File

SIGNED: James Taillon

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 3

DATE: April 23, 1998

TIME: 9:13 AM

TO: John Palmieri

COMPANY: FCDMC

FAX NO.: 506-4601

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph C      JOB NO.: 94153.06

SUBJECT: Storm Drain Right of Way

COMMENTS:

John,

Attached are Meeting Minutes from April 2, 1998.

Thank You,

James Taillon

CC: File

RW Shobe

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 4

DATE: April 22, 1998

TIME: 8:08 AM

TO: RW Shobe

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph C      JOB NO.: 94153.06

SUBJECT: Burlington Northern Railroad Easement Request

COMMENTS:

RW,

Attached is a copy of the railroad easement request at 66<sup>th</sup> Ave and  
Grand Ave sent to Burlington Northern Santa Fe Railroad for permitting.

Thank You.

CC: File

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 3

DATE: 4/21/98

TIME:

TO: Dan Stenwood

FAX NO: 915-2689

COMPANY:

City of Glendale

FROM: James Tallon

JOB NO.: 94153.04

PROJECT: Northern/Orangewood PH II B - Glendale Ave

COMMENTS:

Re: 18" COG Waterline in 83<sup>rd</sup> Ave @ Glendale Ave  
Attached are meeting minutes for the  
April 16<sup>th</sup> meeting @ City of Glendale. Please  
let me know if you have any comments or  
concerns.

copy to:

hard copy to follow in mail

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 3

DATE: 4/21/98

TIME:

TO: Glen Compton

FAX NO:

COMPANY:

City of Glendale

FROM: James Tallon

JOB NO.: 94153.04

PROJECT: Northern/Orangewood PH II B - Glendale Ave

COMMENTS:

Re: 18" COG Waterline in 83<sup>rd</sup> Ave @ Glendale Ave  
Attached are meeting minutes for the  
April 16<sup>th</sup> meeting @ City of Glendale. Please  
let me know if you have any comments or  
concerns.

copy to:

hard copy to follow in mail

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 3

DATE: 4/21/98

TIME:

TO: Barry Larson

FAX NO: 915-2689

COMPANY:  
City of Glendale

FROM: James Tallon

JOB NO.: 94153.04

PROJECT: Northern/Orangewood PH II B - Glendale Ave

COMMENTS:

Re: 18" COG Waterline in 83<sup>rd</sup> Ave @ Glendale Ave  
Attached are meeting minutes for the  
April 16<sup>th</sup> meeting @ City of Glendale. Please  
let me know if you have any comments or  
concerns.

copy to:

hard copy to follow in mail

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 3

DATE: 4/21/98

TIME:

TO: RW Shobe

FAX NO: 506-8561

COMPANY:

FCDMG

FROM: James Tallon

JOB NO.: 94153.04

PROJECT: Northern/Orangewood PH II B - Glendale Ave

COMMENTS:

Re: 18" COG Waterline in 83<sup>rd</sup> Ave @ Glendale Ave  
Attached are meeting minutes for the  
April 16<sup>th</sup> meeting @ City of Glendale. Please  
let me know if you have any comments or  
concerns.

copy to:

hard copy to follow in mail

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203  
 Phoenix, AZ 85014  
 (602) 234-1344 • FAX 234-1322  
 TO:  
 Bolduc, Smiley & Associates, Inc.

DATE: April 21, 1998	JOB NO. 94153.02
ATTENTION: Terry Smiley	
RE: Northern/Orangewood Storm Drain	
Glendale Avenue - Sub-Phase "B"	
5080 North 40 <sup>th</sup> Street, Suite 250	
Phoenix, Arizona 85018	

WE ARE SENDING YOU     Attached     Under separate cover via PICK-UP the following items:

Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Blueines     Specifications  
 Copy of letter     Drainage Report     Other (Plan View Alignment)

COPIES	DATE	NO.	DESCRIPTION
1		1	Plan View Glendale Ave - 98 <sup>th</sup> Ave to 83 <sup>rd</sup> Ave

THESE ARE TRANSMITTED as checked below:

For approval     Approved as submitted     Approved as noted  
 For your use     As requested     For review and comment

REMARKS: Terry,

Attached is a copy of the proposed alignment for the Storm Drain in Glendale Avenue.

As discussed the entire alignment is located on the south side of Glendale Ave. We will need a narrative for traffic issues for the 30% report. It is our intent to submit at the end of this month.

If you have any questions or require additional information, please let me know.

Thank You.

COPY TO: Project File, Chronological File                      SIGNED: James Taillon

Darrel E. Wood, P.E., R.L.S.  
Ashok C. Patel, P.E., R.L.S.  
James S. Campbell, P.E.  
Gordon W. R. Wark, P.E.  
Thomas R. Gettings, R.L.S.  
Bruce Friedhoff, P.E.  
Scott A. Nelson, R.L.S.  
Richard L. Hiner, P.E.  
Fredrick K. Schneider, P.E.  
Timothy A. Huval, P.E.  
Michael J. Sexton, R.L.S.  
Jack K. Moody, P.E.  
Leslie J. Kland, P.E.  
Carl Sitterley, R.L.S.  
Curtis L. Brown, P.E.

**MINUTES OF MEETING**

**PROJECT:** Northern/Orangewood Storm Drain Project, Phase II  
Sub-Phase "C"  
WP #94153.06

**DATE:** April 20, 1998

**LOCATION:** Flood Control District of Maricopa County (FCDMC)

**ATTENDEES:** R. W. Shobe, P.E. - FCDMC  
Mike Lopez, P.E. - FCDMC  
Richard Harris, P.E. - FCDMC  
Ash Patel, P.E. - Wood/Patel *hy*  
Shimin Zou - Wood/Patel

**SUBJECT:** East Basin Hydrology

This meeting was a follow-up meeting from the previous meeting held on April 15, 1998. In that meeting, a brief description of the basin design concept was given. Mike requested that Wood/Patel review a modified basin concept in which a mechanical gate will be introduced to make the basin function as an off-line facility. It was also discussed that a completely off-line type of facility was not feasible due to the Grand Avenue drainage and ground elevations associated with Grand Avenue. Therefore, a combination of off-line/on-line concept was presented to the FCDMC (see Plate 1). It was agreed that the concept was acceptable. A design parameter change had to be made to make this concept work, however. The drainage intercepted along Grand Avenue can no longer meet the 10-year storm capacity requirement. However, the drainage contribution from the east side (upstream) watershed can be more effectively collected and retained with the flood pool elevation of 1141 (raised from the concept design elevation of 1135).

In this follow-up meeting, Wood/Patel presented hydrologic analysis results for various frequencies and basin size combinations (see Plate 2). It was agreed that due to the high complexity associated with the hydrologic/hydraulic modeling processes, a more workable simplified analytical approach will be used. Wood/Patel will prepare a preliminary submittal for the FCDMC's concurrence which will include:

1. HEC-1 analysis for the 10-year inflow from the easterly watershed.
2. HEC-1 analysis for the Grand Avenue watershed to determine approximate design frequency for the proposed Grand Avenue storm drain system.
3. Hydraulic grade line calculations for the storm drain system.
4. Sketches for at least two inflow hydrographs including basin flood elevation data.
5. Basin storage volume/elevation relationships.

## MINUTES OF MEETING

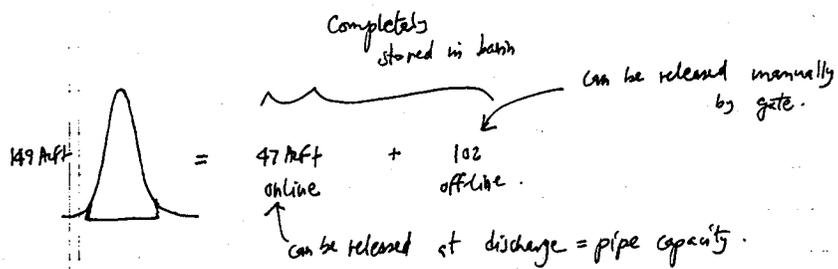
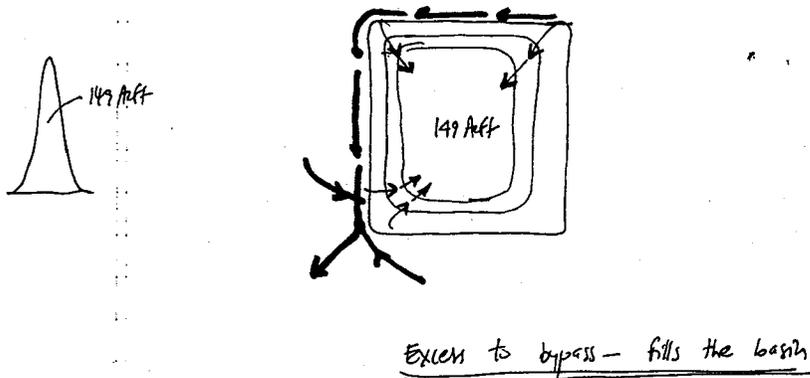
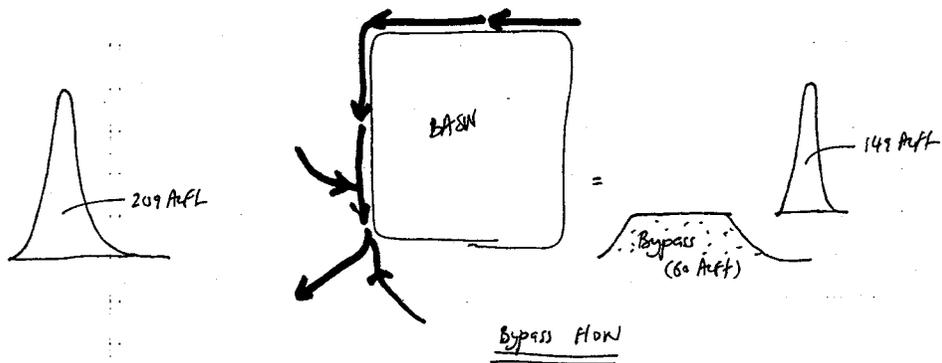
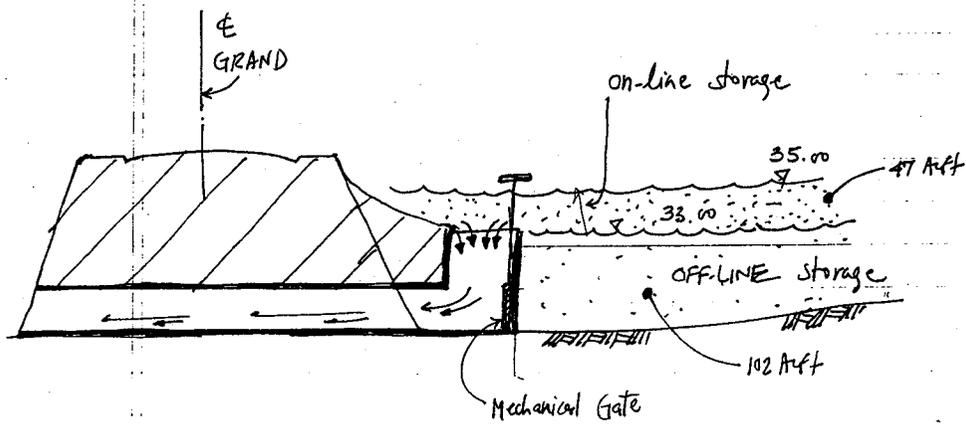
Northern/Orangewood Storm Drain Project, Phase II  
Sub-Phase "C"  
WP #94153.06

Page 2  
April 20, 1998

### Action Items:

1. R.W. to revise the ADOT IGA to delete the up-sizing pipe requirement for Grand Avenue between 67<sup>th</sup> Avenue and 65<sup>th</sup> Avenue.
2. R.W. to initiate a meeting with the City of Glendale to discuss potential changes to the 10-year pipe capacity along the west side of the East basin.

Distribution:  
All attendees



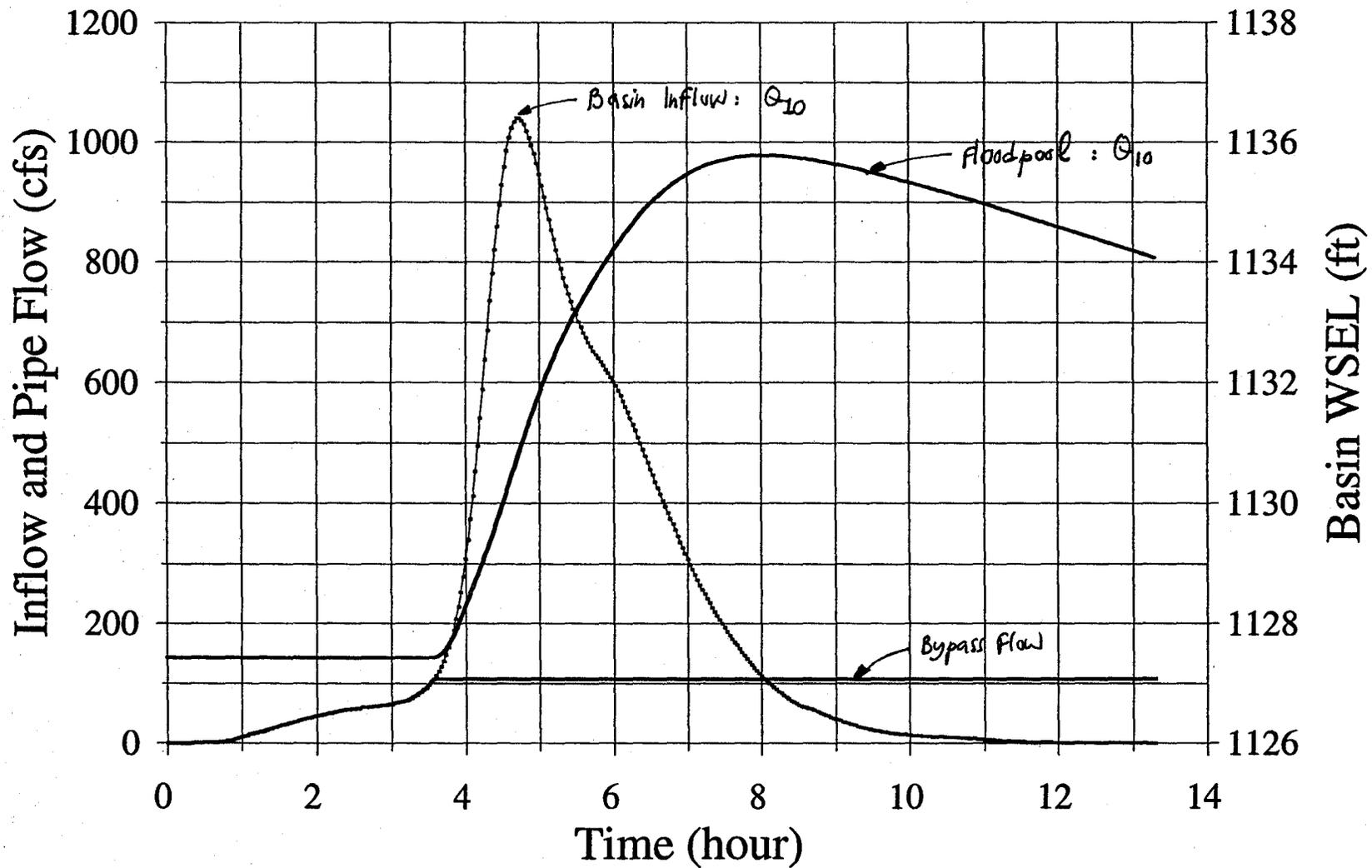
**Northern Orangewood Phase 2 Modeling Results**  
**East Basin as an Off-Line Basin**  
*(With Mechanical Gate)*

			10-Year	25-Year	50-Year	100-Year
HEC-1 File Name			N_O-ph2.*	PH2-25.*	PH2-50.*	PH2-100.*
Rainfall Depth	PB	(in)	1.92	2.36	2.68	3.00
East Basin Inflow Peak	Qp	(cfs)	1041	1340	1556	1773
Total Inflow Volume	Vol	(A-F)	209	268	312	357
Max SD By-Pass Flow	Qm	(cfs)	108	100	95	90
Total By-Pass Volume	Vp	(A-F)	60	60	60	60
East Basin Storage	SV	(A-F)	149	208	252	297
East Basin Surge Flow	Qs	(cfs)	933	1240	1461	1683
East Basin Area	A	(acres)	15	20	23	27
East Basin Max. WSEL	WSEL	(ft)	1142	1142	1142	1142
West Basin Storage	Vw	(A-F)	39	42	44	45

PLATE 2  
 sht. 1/2

# Northern Oranewood Phase II

## East Basin - 100-yr size, 10-yr flow



Darrel E. Wood, P.E., R.L.S.  
Ashok C. Patel, P.E., R.L.S.  
James S. Campbell, P.E.  
Gordon W. R. Wark, P.E.  
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Jack K. Moody, P.E.  
Leslie J. Kland, P.E.  
Carl Sitterley, R.L.S.  
Curtis L. Brown, P.E.

## MINUTES OF MEETING

**PROJECT:** Northern Orangewood Storm Drain, Phase 2  
Sub-Phase "B"  
WP #94153.04

**SUBJECT:** 18-Inch Waterline in 83<sup>rd</sup> Avenue at Glendale Avenue

**PLACE:** City of Glendale

**DATE:** April 16, 1998

**ATTENDEES:** Dan Sherwood, City of Glendale  
Barry Larson, City of Glendale  
Glen Compton, City of Glendale  
James Taillon, Wood/Patel

JGT

The City of Glendale is in the process of preparing 18-inch waterline plans for 83<sup>rd</sup> Avenue between Bethany Home Road and Glendale Avenue. The waterline will run north/south and will be located 16-feet east of the monument line of 83<sup>rd</sup> Avenue and will extend to the west in Glendale Avenue 37-feet north of the monument line, approximately 100-feet. This waterline alignment will entail two dip crossings for the proposed Flood Control Districts' storm drain in Glendale Avenue and the storm drain alignment in 83<sup>rd</sup> Avenue. The City is concerned about an existing 12-inch waterline that runs parallel to the 18-inch waterline. Based on pothole information the waterline sits close to the top of a 42-inch irrigation on the south side of Glendale Avenue. Based on the storm drain alignment, this will require a vertical drop in the waterline in order to avoid a vertical conflict. The City asked if Wood/Patel had designed the storm drain to the east. This leg of the storm drain has not been designed, but the flows have been developed for this area. The City recommended that as part of the storm drain project Wood/Patel will extend the storm drain east in Glendale Avenue to 10-feet east of the east curb return so that future extension of the storm drain will not entail disruption of the intersection.

It was determined that the projected invert of the storm drain based on matching invert elevations provided by Wood/Patel would be used to design the waterline vertical alignment. The City of Glendale will leave the 18-inch dipped waterline section as currently designed and will dip the 12-inch waterline in parallel with the 18-inch waterline to prevent a second disruption of waterline system during the storm drain construction.

The City of Glendale provided Wood/Patel with the plans of the intersection with the 18-inch waterline dip, the 12-inch waterline dip has not been designed yet.

Dan Sherwood suggested that as part of the storm drain extension to the east of 83<sup>rd</sup> Avenue and Glendale Avenue that the inlets constructed at the northeast and southeast returns be oversized due to the fact that the storm drain will probably not be extended to the east for some time in the future. The waterline plans are scheduled to go to bid in mid June of this year and the City will provide Wood/Patel with a final set of plans once they are complete.

Wood/Patel inquired as to the status of the sanitary sewer re-alignment plans for Glendale Avenue. Dan Sherwood indicated that at this time no plans are being prepared. It is the City's intent to abandon the 15-inch PVC which is in conflict with the storm drain alignment due to the fact that no one is being served off of that line at this time.

Wood/Patel inquired to the City whether or not they had any knowledge of a telecommunications conduit in Glendale Avenue near the monument line within the medians. Wood/Patel received information from Tim Kundson of CVL who previously worked for the City of Glendale. He indicated that in a past construction project the City uncovered a telecommunications conduit which was not shown on any plans. Wood/Patel indicated that they contacted both US West and Luke Air Force Base and have been told that there are no lines in Glendale Avenue which are not shown on the US West mapping. The City of Glendale can not shed any light on this topic, although Dan Sherwood suggested that Wood/Patel contact Bob Friess at US West to inquire about this line.

Wood/Patel indicated to Dan Sherwood that in a previous meeting the City of Glendale requested Wood/Patel to provide stub-outs to the north at 660-foot intervals or 1/8 mile streets for future connections. Wood/Patel has determined that median openings in Glendale Avenue near 83<sup>rd</sup> Avenue did not align with the 660-foot street spacing and requested directions. At this time, according to Dan Sherwood it is unclear as to what is going to happen in Glendale Avenue due to the Continental Homes master plan project in the area. He indicated that 30% plans stub-out spacing should be placed as previously directed.

cc: R.W. Shobe  
Attendees

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 3

DATE: April 16, 1998

TIME: 10:31 AM

TO: Olin Sutton

COMPANY: FCDMC

FAX NO.: 506-4601

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph B      JOB NO.: 94153.04

SUBJECT: Glendale Avenue Storm Drain Control

COMMENTS:

Olin,

Attached is a copy of the control drawing for the Glendale Ave.

Storm Drain for use on potholing.

Thank You,

James Taillon

CC: File

RW Shobe

**FAX TRANSMITTAL**

PAGE 1 OF 3

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

.....  
DATE: April 16, 1998  
.....

.....  
TIME: 10:30 AM  
.....

TO: RW Shobe (Copy of original sent to Olin Sutton)

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph B      JOB NO.: 94153.04

SUBJECT: Glendale Avenue Storm Drain Control

COMMENTS:

Olin,

Attached is a copy of the control drawing for the Glendale Ave.

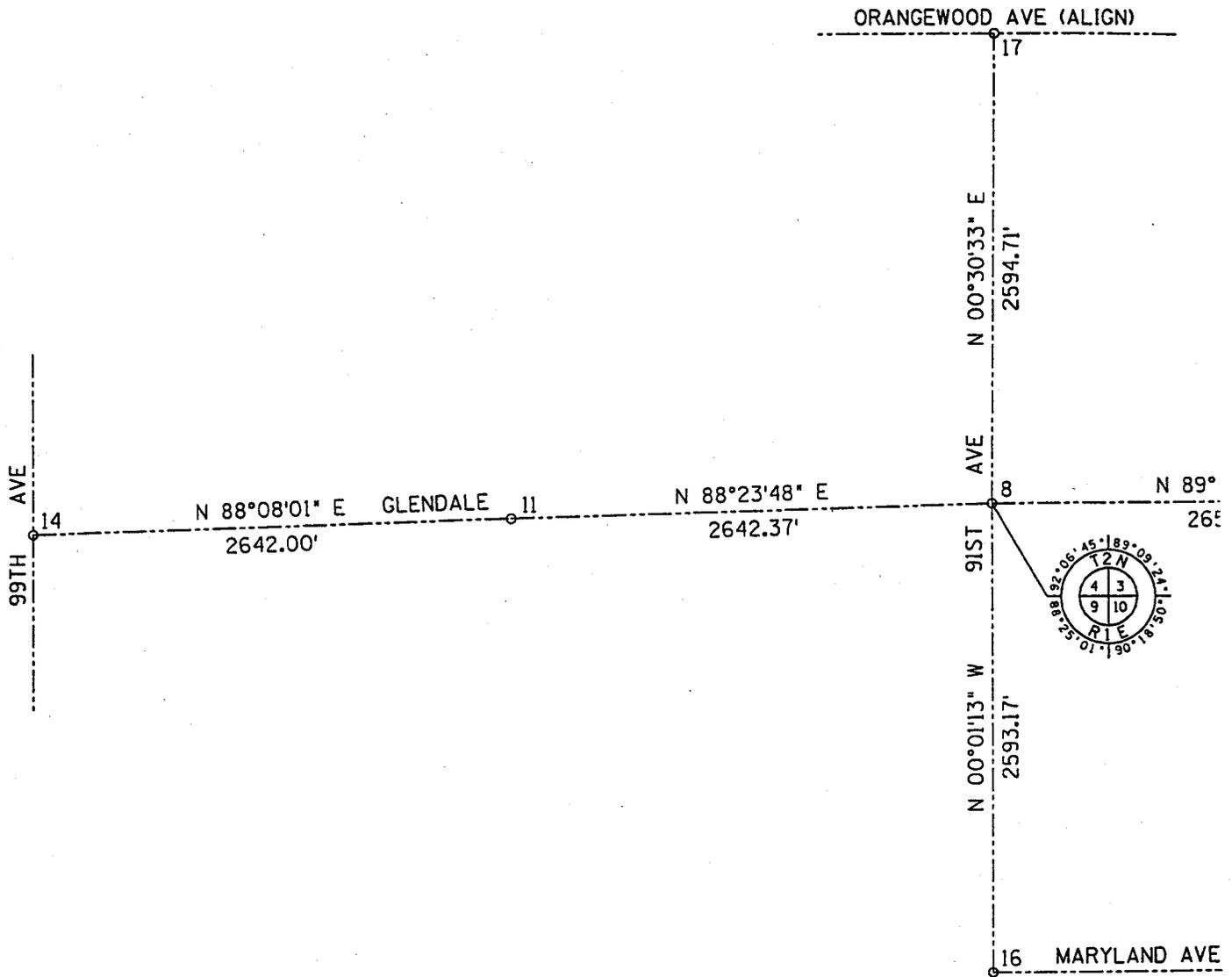
Storm Drain for use on potholing.

.....  
Thank You,

.....  
James Taillon  
.....

CC: File

RW Shobe



	NO.	NORTHING	EASTING	ELEVATION	DESCRIPT
DATUM:	5	23387.93	99803.33	1089.55	BC IN HH CENTERLINE GLE
BRASS CAP IN HAND HOLE AT THE INTERSECTION OF GLENDALE AVENUE AND 91ST AVENUE.	8	23372.45	97148.11	1077.91	BC IN HH CENTERLINE GLE
ELEV = 1077.91 (NGVD 1929)	11	23298.51	94506.77	1067.53	BC IN HH CENTERLINE GLE
	14	23212.47	91866.17	1066.91	BC IN HH CENTERLINE GLE
	15	26023.15	102438.97		BC IN HH CENTERLINE ORA
	16	20779.27	97149.03		BC IN HH CENTERLINE MAF
	17	25967.05	97171.16		BC IN HH CENTERLINE ORA
NOTE: CONSTRUCTION € = MONUMENT €	116	23403.72	192457.84	1094.97	BC IN HH CENTERLINE GLE

E (ALIGN)

15 ORANGEWOOD AVE

83RD AVE N 00°24'46" W 2619.51'

N 89°39'57" E AVE 5 2655.27'

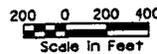
N 89°39'34" E 116 2654.56'



MARYLAND AVE

DESCRIPTION

- 2 IN HH CENTERLINE GLENDALE AVE & 87TH AVE (ALIGN)
- C HH CENTERLINE GLENDALE AVE & 91ST AVE
- C HH CENTERLINE GLENDALE AVE & 95TH AVE (ALIGN)
- C IN HH CENTERLINE GLENDALE AVE & 99TH AVE
- C IN HH CENTERLINE ORANGEWOOD AVE & 83RD AVE
- C HH CENTERLINE MARYLAND AVE & 91ST AVE
- C HH CENTERLINE ORANGEWOOD AVE (ALIGN) & 91ST AVE
- C IN HH CENTERLINE GLENDALE AVE & 83RD AVE



NO.	REVISION	BY	DATE
<b>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</b>			
<b>GLENDALE AVE STORM DRAIN SUB-PHASE "B" CONTRACT FCD - PHASE II</b>			
PRELIMINARY 30% SUBMITTAL NOT FOR CONSTRUCTION	DESIGNED	J. TAILLON	03/98
	DRAWN	A. LINN	03/98
	CHECKED	A. PATEL	03/98
		BY	DATE
		WOOD, PATEL & ASSOCIATES, INC.	
		1550 EAST MISSOURI, SUITE 203	
		PHOENIX, ARIZONA (602) 234-1344	
HORIZONTAL AND VERTICAL CONTROL SHEET			SHEET OF 4 00

TRACS NO.

Darrel E. Wood, P.E., R.L.S.  
 Ashok C. Patel, P.E., R.L.S.  
 James S. Campbell, P.E.  
 Gordon W. R. Wark, P.E.  
 Thomas R. Gettings, R.L.S.  
 Bruce Friedhoff, P.E.  
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 Richard L. Hiner, P.E.  
 Fredrick K. Schneider, P.E.  
 Timothy A. Huval, P.E.  
 Michael J. Sexton, R.L.S.  
 Jack K. Moody, P.E.  
 Leslie J. Kland, P.E.  
 Carl Sitterley, R.L.S.  
 Curtis L. Brown, P.E.

**MINUTES OF MEETING**

April 15, 1998  
 WP# 94153.06

**PROJECT:** Northern/Orangewood Storm Drain, Phase II  
 Sub-Phase "C"

**SUBJECT:** East Basin Design Criteria

**PLACE:** City of Glendale

**ATTENDEES:**

Grant Anderson,	City of Glendale
Dan Sherwood,	City of Glendale
R.W. Shobe,	FCDMC
Ash Patel,	Wood/Patel
James Taillon,	Wood/Patel
Shimin Zou,	Wood/Patel

*WST*

Wood/Patel gave an brief overview of Phase "C" of the Northern/Orangewood Storm Drain Project and described the design criteria used for the east and west basins. The east basin was designed as an off-line basin and the west basin as an on-line basin at the concept routing study level of this project. Prior to the design phase of Sub-Phase "C" the District requested Wood/Patel to perform a more detailed analysis of the east basin to determine if the dead storage available at this site could be utilized to detain run-off from an event greater than the 10-year, 6-hour storm. Wood/Patel preformed this analysis and determined that the basin designed as an off-line facility, could be used to detain the run-off for the drainage area upstream of the east basin from a 100-year event. However, the City of Glendale has indicated to Wood/Patel that a manual or electronic gate for the release of detained runoff is unacceptable. In effect, this requires the east basin to be designed as an on-line basin. This will eliminate the utilization of the dead storage for an event greater than the 10-year, 6-hour storm and will also require the west basin to be significantly increased in size to account for the extended hydrograph being produced from the on-line east basin run-off.

In order to allow for nuisance flows or low flow events to bypass the basin the City of Glendale suggested that the basin bottom elevation be raised so that flows within the bottom several feet of the storm drain will be able to bypass the basin without overflowing into the basin. The hydraulic grade line in the basin needs to be reviewed with respect to the controlling hydraulic grade line at 67<sup>th</sup> Avenue and Northern Avenue to avoid any adverse impact to the proposed Grand Avenue Storm Drain. This may limit the amount the bottom of the basin can be raised.

Northern Orangewood Storm Drain, Phase 2  
Sub-Phase "C"  
East Basin Design Criteria

May 18, 1998  
WP #94153.06  
Page 2

The City of Glendale indicated that their preference for the design of the east basin is as follows:

1. Restrict the basin bypass by reducing the outfall pipe size in order to try to minimize the impact to the west basin.
2. Raise the basin bottom elevation to allow bypass flow to sercomvent the basin.
3. Provide a terraced basin with a small flooding area (2 to 3 acres) immediately adjacent to the outfall pipe.

The area in item 3 above would be flooded in small events, however, the area would be minimized and the flow would eventually bleed off back out of the system. The City of Glendale suggested that Wood/Patel utilize outfall structures similar to those designed for the Maryland Lakes Project. These plans can also be used for an example of overland spillways from the roadways to drain into the basin.

The design criteria to drain the basin within 36 hours needs to be maintained. Wood/Patel indicated that designing the east basin as an on-line basin may entail using all land available in the east basin and increasing the west basin to utilize the entire site which was originally purchased for the west basin. City of Glendale noted that the District already owns the west basin land and the cost for the additional west basin excavation may be offset by selling the excavation to ADOT.

Wood/Patel will contact Dan Sherwood to get a copy of the Maryland Lakes construction drawings and a meeting will be scheduled in approximately two weeks to discuss the design solutions and estimated costs derived by Wood/Patel.

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: April 13, 1998

JOB NO. 94153.04

ATTENTION: Olin Sutton

RE: Northern/Orangewood Storm Drain

Northern/Butler Sub-Phase B

Glendale Ave

WE ARE SENDING YOU • Attached • Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1			Potholling Plan and Profile

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

REMARKS:.

Olin,

Per your request, attached is a copy of the plan and profile for the recommended alignment.

The alignment is shown in red. Pothole locations are based on of 0+00 at 99<sup>th</sup> Ave and Northern.

If you have any questions, please call.

Thank You

COPY TO: Project File, RW Shobe - FCDMC

SIGNED: James Taillon

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 2

DATE: 4/13/90

TIME:

FAX NO: 606-4601

TO: Michael Lopez

FROM: James Taillon

PROJECT: N/O PH 2 C

JOB NO.: 94153.00

COMMENTS:

Meeting Minutes

copy to:

hard copy to follow in mail

WOOD/PATEL

fax transmittal

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS

PAGE 1 OF 7

DATE: 4/13/98

TIME:

FAX NO: 500-8561

TO: RW Stobe

FROM: James Tullon

PROJECT: H/O PH 2 C

JOB NO.: 9453.06

COMMENTS:

Meeting Minutes

copy to:

hard copy to follow in mail

Darrel E. Wood, P.E., R.L.S.  
 Ashok C. Patel, P.E., R.L.S.  
 James S. Campbell, P.E.  
 Gordon W. R. Wark, P.E.  
 Thomas R. Gettings, R.L.S.  
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 Jack K. Moody, P.E.  
 Leslie J. Kland, P.E.  
 Carl Sitterley, R.L.S.  
 Curtis L. Brown, P.E.

**MINUTES OF MEETING**

April 9, 1998  
 WP #94153.06

**PROJECT:** Northern Orangewood Storm Drain Project  
 Phase II Sub-Phase "C"

**SUBJECT:** East and West Basin Design Criteria

**PLACE:** Flood Control District of Maricopa County

**ATTENDEES:**

R.W. Shobe,	FCDMC
Michael Lopez,	FCDMC
Ash Patel,	Wood/Patel
James Taillon,	Wood/Patel
Shimin Zou,	Wood/Patel

Wood/Patel gave a brief overview of Phase "C" and how the east and west basins were designed in the conceptual routing study. In this conceptual analysis, the east basin was designed as an offline basin and the west basin was designed as an online basin. Now that we are beginning the design of this Phase the FCDMC directed Wood/Patel to perform an analysis of the east and west basins both as online basins.

Wood/Patel performed this analysis and determined that if the east basin was designed as an online basin the hydrograph generated from the detention storage would overtax the west basin as currently designed. Wood/Patel requested this meeting with the FCDMC to determine how these basins should be analyzed and to come to an consensus for design criteria.

Based on these discussions it was decided that the stormwater in the east basin would be detained by means of a mechanical gate and the west basin would be designed as an online basin. The gate in the east basin makes it essentially an offline basin. This gate would be manually opened after the peak flows of the storm has exited the system in order to prevent an overtaxing of the downstream system. This was acceptable to both Michael Lopez and R.W. Shobe. Michael Lopez indicated that he would explain to the hydraulic plan reviewer the results of this meeting. Michael Lopez also indicated that a lock should be provided on the mechanical gate in order to prevent the gate from being opened too early. A plaque should also be required on the gate structure indicating whom to call for operation of the gate mechanism.

R.W. Shobe provided Wood/Patel with basin boundaries for the east and west basin and a copy of the IGA or the ADOT participation in the east basin. Wood/Patel indicated on their plans they will provide a sub-out to the northwest and southeast for future ADOT stormdrain connections.

cc: Attendees

MEMOS\94153.06mm-a10

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: April 9, 1998

JOB NO. 94153.04

ATTENTION: Olin Sutton

RE: Northern/Orangewood Storm Drain

Northern/Butler Sub-Phase B

Glendale Ave

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Bluelines     Specifications
- Copy of letter     Drainage Report     Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1			Potholling Plan and Profile

THESE ARE TRANSMITTED as checked below:

- For approval                       Approved as submitted                       Approved as noted
- For your use                               As requested                                       For review and comment

REMARKS:.

Olin,

Per your request, attached is a copy of the plan and profile for the recommended alignment.

The alignment is shown in red. Pothole locations are based on of 0+00 at 99<sup>th</sup> Ave and Northern.

If you have any questions, please call.

Thank You

COPY TO: Project File, RW Shobe - FCDMC

SIGNED: James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: March 27, 1998	JOB NO. 94153.04
ATTENTION: Richard Harris	
RE: Northern/Orangewood Storm Drain	
Phase II, Sub-Phase B	
Glendale Avenue Storm Drain	

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		1	Diskette with Wood/Patel Spreadsheet and StormCad File
1		1	Hard copy of Wood/Patel Spreadsheet and StormCad Output Summary
1		1	Comparison of Hydraulic Grade Lines

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

**REMARKS:.**

Richard,

We intend to utilize the StormCad program for the remaining phases of this project. As shown on the attached Comparison of HGL's from the previous Wood/Patel Spreadsheet and the StormCad output the resulting pipe sizes required to maintain the desired HGL are comparable. Losses at laterals and MH have been accounted for.

Thank You

COPY TO: Project File

SIGNED: James Taillon

# DOT Report

Pipe	-Node- Upstream Downstream	Inlet Area (acres)	Inlet CA (acres)	Total CA (acres)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)
P-7	J-16	0.00	0.00	0.00	1,130.40	1,123.14	0.002470	50.00	Circular	1,320.00	5.2
	J-15				1,126.40	1,119.88	0.003788	61.92	42 inch		
P-6b	J-15	0.00	0.00	0.00	1,126.40	1,119.88	0.001212	50.00	Circular	1,320.00	4.0
	J-14				1,124.00	1,118.28	0.001894	62.51	48 inch		
P-6a	J-14	0.00	0.00	0.00	1,124.00	1,118.28	0.001782	83.00	Circular	1,320.00	5.2
	J-13				1,121.30	1,115.93	0.001894	85.58	54 inch		
P-5b	J-13	0.00	0.00	0.00	1,121.30	1,115.93	0.002383	96.00	Circular	1,320.00	6.0
	J-12				1,116.90	1,112.78	0.002106	90.24	54 inch		
P-5a	J-12	0.00	0.00	0.00	1,116.90	1,112.78	0.002267	124.00	Circular	1,320.00	6.3
	J-11				1,113.60	1,109.79	0.002098	119.30	60 inch		
P-4	J-11	0.00	0.00	0.00	1,113.60	1,109.79	0.002242	159.00	Circular	2,640.00	6.7
	J-10				1,106.00	1,103.87	0.001902	146.43	66 inch		
P-44b	J-10	0.00	0.00	0.00	1,106.00	1,102.54	0.004138	216.00	Circular	1,309.76	9.1
	J-9				1,103.00	1,097.12	0.003268	191.95	66 inch		
P-44a	J-9	0.00	0.00	0.00	1,103.00	1,097.12	0.002699	220.00	Circular	1,309.76	7.8
	J-8				1,095.80	1,093.58	0.003298	243.21	72 inch		
P-43d	J-8	0.00	0.00	0.00	1,095.80	1,091.39	0.003651	386.00	Circular	1,327.28	10.0
	J-7				1,092.40	1,086.55	0.003496	377.69	84 inch		
P-43c	J-7	0.00	0.00	0.00	1,092.40	1,085.37	0.003225	388.00	Circular	1,327.28	10.5
	J-6				1,089.60	1,081.28	0.003503	378.10	84 inch		
P-43b	J-6	0.00	0.00	0.00	1,089.60	1,079.93	0.002881	393.00	Circular	1,327.64	10.4
	J-5				1,084.00	1,076.87	0.003495	453.92	90 inch		
P-43a	J-5	0.00	0.00	0.00	1,084.00	1,075.70	0.002528	395.00	Circular	1,327.64	9.9
	J-4				1,077.60	1,072.91	0.003502	454.41	90 inch		
P-42b	J-4	0.00	0.00	0.00	1,077.60	1,071.85	0.002350	454.00	Circular	1,321.19	9.6
	J-3				1,075.00	1,069.10	0.003504	539.90	96 inch		
P-42a	J-3	0.00	0.00	0.00	1,075.00	1,068.25	0.002446	455.00	Circular	1,321.19	9.1
	J-2				1,068.00	1,065.06	0.003497	539.32	96 inch		
P-41d	J-2	0.00	0.00	0.00	1,068.00	1,064.44	0.001455	485.00	Circular	1,321.00	7.7
	J-1				1,065.60	1,062.57	0.002392	610.67	108 inch		
P-41c	J-1	0.00	0.00	0.00	1,065.60	1,061.98	0.001521	487.00	Circular	138.64	7.7
	ADOT Stubo				1,066.00	1,061.77	0.002380	609.15	108 inch		
P-41b	ADOT Stubo	N/A	N/A	0.00	1,066.00	1,061.77	0.001521	487.00	Circular	70.00	7.7
	Exist J-MH1				1,066.00	1,061.66	0.002571	633.14	108 inch		
P-41a	Exist J-MH1	N/A	N/A	0.00	1,066.00	1,061.10	0.001412	487.00	Circular	80.78	7.7
	Outlet				1,066.00	1,061.00	0.004085	798.03	108 inch		

**NORTHERN/ORANGEWOOD STORM DRAIN PROJECT**

**Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue**

**Phase II, Sub-Phase B**

**Flood Control District of Maricopa County**

3/27/98

**Contract FCD 94-12**

**PHASE II**

**Sub-phase "B"**

**W/P # 94153.04**

**Comparison of Wood/Patel Spreadsheet HGL with StormCad HGL**

W/P Spreadsheet: Glen30.xls

StormCad File: Glenwbfc.stm

**Glendale Avenue - AFF Outfall Channel to West Basin**

Storm Sewer Line Location	Pipe #	Wood/Patel 30% Spreadsheet Pipe Size (in)	StormCad Pipe Size (in)	Natural Ground Elevation (ft)	Invert Elev. (ft)	Design Q (cfs)	Wood/Patel Const Phasing Plan HGL (ft)	Wood/Patel 30% Spreadsheet HGL (ft)	StormCad Hydraulic Grade Line (ft)
Outfall @ AFF		108	108	1066.00	1052.00	487	1060.00	1061.00	1061.00
AFF to ADOT MH	41a	108	108	1066.00	1052.33	487		1061.21	1061.10
MH to ADOT Stubout	41b	108	108	1066.00	1052.51	487		1061.37	1061.77
Stubout to 97th Ave	41c	108	108	1065.60	1052.84	487		1062.16	1061.98
97th to 95th Ave	41d	108	108	1068.00	1056.00	485	1065.18	1064.20	1064.44
95th to 93rd Ave	42a	96	96	1075.00	1060.62	455		1067.38	1068.25
93rd to 91st Ave	42b	90	96	1077.60	1065.25	454		1072.17	1071.85
91st to 89th Ave	43a	90	90	1084.00	1069.90	395		1076.65	1075.70
89th to 87th Ave	43b	84	90	1089.60	1074.54	393		1081.90	1079.93
87th to 85th Ave	43c	84	84	1092.40	1079.19	388		1087.39	1085.37
85th to 83rd Ave	43d	84	84	1095.80	1083.83	386	1092.03	1092.79	1091.39
83rd to Myrtle Ave	44a	72	72	1103.00	1088.15	220		1097.46	1097.12
Myrtle to Orangewood	44b	72	66	1106.00	1092.43	216	1101.00	1102.73	1102.54
Orangewood to 79th Ave	4	66	66	1113.60	1097.45	159	1108.28	1109.07	1109.79
79th to 77th Ave	5a	60	60	1116.90	1100.22	124		1113.16	1112.78
77th to 75th Ave	5b	60	54	1121.30	1103.00	96	1115.48	1115.41	1115.93
75th to 73rd Ave	6a	54	54	1124.00	1105.50	83		1117.81	1118.28
73rd to 71st Ave.	6b	48	48	1126.40	1108.00	50	1121.00	1119.68	1119.88
71st to 69th Ave.	7	42	42	1130.40	1113.00	50	1122.84	1122.82	1123.14

STORM DRAIN HYDRAULIC GRADE LINE COMPUTATION WORKSHEET

Project: Northern/Orangewood Storm Drain Phase II B Glendale Ave - City of Glendale

Engineer: JGT File Name: q:\northern\PHI13076\Plans\Glen30.xls 3/27/98

Description: Computation of HGL & EGL for storm drain system

Reference: Drainage Design Manual for Maricopa County, Arizona  
Volume II, Hydraulics, January 1996

Last Revised: February 3, 1998

Notes:

- This spreadsheet is developed to compute storm drain hydraulic grade line based on the above mentioned reference. All Equations used and minor loss coefficients shall be referred to this reference.
- The blue areas are user input blocks. The white areas are computed values.
- The recommended flow type for storm drain systems by the reference is pressure flow. Therefore, open channel flow computation is only an approximation here. The hydraulic grade line at the outfall is assumed to be the invert elevation plus the pipe diameter. If the tailwater elevation is different from this value, the user should change this number manually.
- The station is located at the immediate downstream of a change point.
- If the number of rows of the spreadsheet is not enough for a project, the user can copy more rows to the bottom of the spreadsheet.
- This spreadsheet calculates suggested pipe diameters with increment of 150 mm (6 inches). User can select different values than the suggested.
- Manning's n values can be selected from Table 4.1.
- The Transition Loss Column (Kt) is the summation of Kt values for each section, and the individual Kt values are from Tables 4.2 to 4.4 based on the transition type: a) gradual enlargement, b) sudden enlargement, c) contraction, the D2/D1 ratio, the velocity in, and other related information on those tables.
- The Bend Loss Column is the summation of Kb values for each section including manhole losses, Bend Losses and Lateral Flow Losses. The individual bend Kb values are from Figure 4.7.
- A column is provided for minor losses other than the types considered in the spreadsheet. The user should input these values directly.
- If users find any error or have any suggestion, please contact Wood/Patel & Associates.

Glendale Avenue - AFF Outfall Channel to 83rd Avenue

Storm Sewer Line Station Location	Pipe #	Station (ft)	Pipe Length (ft)	Pipe Diameter			n	Natural Ground Elevation (ft)	Invert Elev. (ft)	Pipe Slope (ft/ft)	Design Q (cfs)	Transition Loss Coeff. Sum(Kt)	Bend Loss Coefficient				D2/D1	Vel. (ft/s)	Fall Area (ft²)	V²/2(g)	K	Sf (ft/ft)	Losses					Total Losses (ft)	Cover Passing HGL (ft)	Hydraulic Grade Line Elevation (ft)	Energy Grade Line Elevation (ft)	Pressure Flow Check	Comments	Depth to Hydraulic Grade Line (ft)	Depth to Invert (ft)
				Sheet Suggested (in)	Concept Pipe Size (in)	User Selected (in)							Loss Due to Bend	Loss Due to Lat Flow	Loss Due to Manholes	Total Bend Loss Coeff. Sum(Kb)							hf (ft)	ht (ft)	hb (ft)	hj (ft)	O'bers (ft)								
Outfall @ AFF	10+57.36		1057.36	0	108	108	0.013	1068.00	1052.00		487	0.00	0.00	0.00	0.00	1.00	7.66	63.62	0.910	0.0109	0.0034	0.470	0.000	0.000	0.000	0.000	0.000	0.000	1060.00	1061.00	1061.91	OK		5.00	14.00
AFF to ADOT MH	11+07.36	41a	1107.36	140	102	108	0.013	1066.00	1052.33	0.0024	487	0.00	0.00	0.05	0.05	1.00	7.66	63.62	0.910	0.0109	0.0034	0.470	0.000	0.041	0.000	0.000	0.470		1061.21	1062.12	OK		4.79	13.67	
MH to ADOT Stubout	11+82.36	41b	1182.36	75	102	108	0.013	1066.00	1052.51	0.0024	487	0.00	0.64	0.00	0.64	1.00	7.66	63.62	0.910	0.0109	0.0034	0.252	0.000	0.582	0.000	0.000	0.293		1061.37	1062.28	OK		4.83	13.49	
Stubout to 97th Ave	13+21.00	41c	1321.00	138.64	102	108	0.013	1065.60	1052.84	0.0024	487	0.10	0.00	0.05	0.05	1.00	7.66	63.62	0.910	0.0109	0.0034	0.486	0.001	0.041	0.000	0.000	1.048		1062.16	1063.07	OK		3.44	12.78	
97th to 95th Ave	26+42.00	41d	2642.00	1321	102	108	0.013	1068.00	1056.00	0.0024	485	0.00	0.00	0.15	0.14	1.00	7.62	63.62	0.903	0.0109	0.0033	4.401	0.000	0.258	0.000	0.000	4.443	1065.16	1064.20	1065.11	OK		3.80	12.00	
95th to 93rd Ave	39+83.19	42a	3983.19	1321.19	96	96	0.013	1075.00	1060.62	0.0035	455	0.10	0.00	0.20	0.19	1.13	9.05	50.27	1.272	0.0109	0.0055	7.280	0.037	0.497	0.000	0.000	7.518		1067.38	1068.65	OK		7.82	14.38	
93rd to 91st Ave	52+84.38	42b	5284.38	1321.19	96	96	0.013	1077.60	1065.25	0.0035	454	0.00	0.00	0.10	0.25	1.07	10.26	44.18	1.640	0.0109	0.0077	10.199	0.000	0.567	0.000	0.000	10.733		1072.17	1073.81	OK		5.43	12.35	
91st to 89th Ave	66+12.02	43a	6612.02	1327.64	90	96	0.013	1084.00	1069.90	0.0035	395	0.10	0.00	0.27	0.19	1.00	8.94	44.18	1.241	0.0109	0.0058	7.758	0.038	0.566	0.000	0.000	8.325		1076.65	1077.89	OK		7.35	14.11	
89th to 87th Ave	79+39.66	43b	7939.66	1327.64	90	96	0.013	1089.60	1074.54	0.0035	393	0.00	0.00	0.10	0.24	1.07	10.21	38.48	1.619	0.0109	0.0084	11.095	0.000	0.555	0.000	0.000	11.699		1081.90	1083.52	OK		7.70	15.06	
87th to 85th Ave	92+66.94	43c	9266.94	1327.28	90	96	0.013	1092.40	1079.19	0.0035	388	0.00	0.00	0.10	0.24	1.00	10.08	38.48	1.578	0.0109	0.0081	10.812	0.000	0.532	0.000	0.000	11.387		1087.39	1088.97	OK		5.01	13.21	
85th to 83rd Ave	105+94.22	43d	10594.22	1327.28	90	96	0.013	1095.80	1083.83	0.0035	386	0.00	0.00	0.10	0.23	1.00	10.03	38.48	1.562	0.0109	0.0081	10.700	0.000	0.522	0.000	0.000	11.232	1092.03	1092.79	1094.55	OK		3.01	11.97	
83rd to Myrtle Ave	119+03.98	44a	11903.98	1309.76	72	72	0.013	1103.00	1088.15	0.0033	220	0.10	1.04	0.75	0.14	1.93	1.17	7.78	28.27	0.940	0.0109	0.0060	7.805	0.003	1.815	0.000	0.000	8.327		1097.48	1098.40	OK		5.54	14.85
Myrtle to Orangewood	132+13.74	44b	13213.74	1309.76	72	72	0.013	1106.00	1092.43	0.0033	218	0.00	0.00	0.10	0.14	1.00	7.64	28.27	0.908	0.0109	0.0057	7.523	0.000	0.214	0.000	0.000	9.342	1101.90	1102.73	1103.63	OK		3.27	13.57	
Orangewood to 79th Ave	158+53.74	4	15853.74	2840	72	66	0.013	1113.60	1097.45	0.0019	159	0.10	1.04	0.25	0.17	1.46	1.09	6.69	23.76	0.895	0.0109	0.0050	13.069	0.008	1.018	0.000	0.000	13.263	1109.28	1109.78	1109.78	OK		4.53	16.15
79th to 77th Ave	171+73.74	5a	17173.74	1320	66	60	0.013	1116.90	1100.22	0.0021	124	0.10	0.00	0.20	0.09	1.10	8.32	19.83	0.819	0.0109	0.0050	8.607	0.025	0.181	0.000	0.000	7.833		1113.16	1113.78	OK		3.74	16.88	
77th to 75th Ave	184+93.74	5b	18493.74	1320	60	60	0.013	1121.30	1103.00	0.0021	96	0.10	0.00	0.20	0.06	1.00	4.89	19.83	0.371	0.0109	0.0030	3.980	0.005	0.095	0.000	0.000	4.167	1115.48	1115.41	1115.78	OK		5.89	18.30	
75th to 73rd Ave	198+13.74	6a	19813.74	1320	54	54	0.013	1124.00	1105.50	0.0019	83	0.10	0.00	0.10	0.06	1.11	5.22	15.90	0.423	0.0109	0.0039	5.193	0.018	0.069	0.000	0.000	5.293		1117.81	1118.24	OK		6.19	18.50	
73rd to 71st Ave	211+33.74	6b	21133.74	1320	48	48	0.013	1126.40	1108.00	0.0019	50	0.00	0.00	0.20	0.04	1.13	3.98	12.57	0.246	0.0109	0.0027	3.532	0.000	0.058	0.000	0.000	3.619	1121.00	1119.88	1119.92	OK		6.72	18.40	
71st to 69th Ave	224+53.74	7	22453.74	1320	42	42	0.013	1130.40	1113.00	0.0038	50	0.10	0.00	0.06	0.06	1.14	5.20	9.62	0.419	0.0109	0.0055	7.199	0.048	0.026	0.000	0.000	7.257	1122.84	1122.82	1123.24	OK		7.58	17.40	
69th to 67th Ave	237+73.74	7a	23773.74	1320	66	66	0.013	1133.40	1118.00	0.0038	179	0.34	0.00	0.13	0.13	0.84	7.53	23.76	0.881	0.0109	0.0063	8.282	0.191	0.117	0.000	0.000	8.355	1126.26	1126.18	1127.06	OK		7.22	15.40	
67th to 66th Ave	244+33.74	8	24433.74	660	66	66	0.013	1138.00	1119.00	0.0015	108	0.10	0.00	0.30	0.02	1.00	4.55	23.76	0.321	0.0109	0.0023	1.507	0.015	0.101	0.000	0.000	1.815	1128.56	1127.73	1128.05	OK		10.27	19.00	
66th to Frier Dr	257+53.74	9	25753.74	1320	54	66	0.013	1146.00	1124.00	0.0038	108	0.10	1.04	0.07	1.11	1.10	5.50	19.83	0.470	0.0109	0.0038	5.012	0.000	0.622	0.000	0.000	5.129	1130.24	1129.97	1130.44	OK		16.03	22.00	
Frier Dr to 65th Ave	264+13.74	10	26413.74	660	54	66	0.013	1142.00	1126.00	0.0030	108	0.00	1.04	0.02	1.06	1.00	5.50	19.83	0.470	0.0109	0.0038	2.506	0.000	0.500	0.000	0.000	3.028	1131.61	1131.63	1132.10	OK		10.37	16.00	
65th to Northern Ave	277+33.74	11	27733.74	1320	48	48	0.013	1145.00	1131.00	0.0038	71	0.10	0.00	0.07	0.07	1.25	5.85	12.57	0.496	0.0109	0.0054	7.121	0.026	0.037	0.000	0.000	7.621	1135.31	1135.33	1135.82	OK		9.87	14.00	
65th to 67th Ave	290+53.74	12	29053.74	1320	54	54	0.013	1143.00	1135.50	0.0034	111	0.00	0.00	0.11	0.11	0.89	6.98	15.90	0.756	0.0109	0.0070	9.287	0.000	0.086	0.000	0.000	9.350	1140.25	1139.34	1140.09	OK		3.86	7.50	



**FAX TRANSMITTAL**

PAGE 1 OF 7

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

DATE: March 18, 1998

TIME: 10:34 AM

TO: RW Shobe

COMPANY: FCDMC

FAX NO.: 506-8561

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph B      JOB NO.: 94153.04

SUBJECT: Storm Drain Alignment Cost Analysis

COMMENTS:

RW,

Attached is the Cost Analysis for the Glendale Ave. St Dr Alignment.

Cost were estimated for the COG Std Alignment (4'South of CL) and  
the south side alignment now being considered by the COG.

Costs for these alignments were done based on two pavement  
pay widths and two pavement structural sections. See attached  
Summary Sheet for explanation.

If you have any questions, please call.

Thank You.

CC: File

## STORM DRAIN ALIGNMENT COST COMPARISONS

### Summary

#### NORTHERN/ORANGEWOOD STORM DRAIN PROJECT

3/18/98

**Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue  
Phase II, Sub-Phase B  
Flood Control District of Maricopa County**

**Contract FCD 94-12  
PHASE II  
Sub-phase "B"  
W/P # 94153.04**

#### 30% Alignment Analysis

<u>Location</u>	<u>Pavement Pay Width</u>	<u>Pavement Section</u>	<u>Sub-Total</u>	<u>15% Contingency</u>	<u>Total</u>
South Side Alignment	MAG	4" AC on 12" ABC	\$3,317,266	\$497,590	\$3,814,856
South Side Alignment	Geotech Recommendation	4" AC on 12" ABC	\$3,545,626	\$531,844	\$4,077,470
COG Std Location	MAG	4" AC on 12" ABC	\$3,081,936	\$462,290	\$3,544,227
COG Std Location	Geotech Recommendation	4" AC on 12" ABC	\$3,245,216	\$486,782	\$3,731,999
South Side Alignment	MAG	8" AC on 9" ABC	\$3,658,106	\$548,716	\$4,206,822
South Side Alignment	Geotech Recommendation	8" AC on 9" ABC	\$4,114,826	\$617,224	\$4,732,050
COG Std Location	MAG	8" AC on 9" ABC	\$3,190,336	\$478,550	\$3,668,887
COG Std Location	Geotech Recommendation	8" AC on 9" ABC	\$3,516,896	\$527,534	\$4,044,431

**Notes:** Pavement Pay Width - The pay width was calculated two ways. MAG is based on the MAG Specifications for pavement pay width Replacement. Geotech Recommendation is pavement replacement based on input from the Geotech Engineer using 1.5/1 max. trench side slopes.

Pavement Section- The pavement design recommendations in the soils report indicate that the existing pavement section for Glendale Ave is 8" AC on 9" ABC. The design section based on city of Glendale procedures is 4" AC on 12" ABC. The city of Glendale will have to make the determination of which structural section to use.

## STORM DRAIN ALIGNMENT COST COMPARISONS

### NORTHERN/ORANGEWOOD STORM DRAIN PROJECT

3/18/98

**Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue**

**Phase II, Sub-Phase B**

**Flood Control District of Maricopa County**

**Contract FCD 94-12**

**PHASE II**

**Sub-phase "B"**

**W/P # 94153.04**

30% Alignment Analysis

Note: These items are common to all alignments

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	108" Storm Drain Pipe	\$390 /LF	1,459 LF	\$568,354
2	96" Storm Drain Pipe	\$275 /LF	1,321 LF	\$363,640
3	90" Storm Drain Pipe	\$247 /LF	2,649 LF	\$654,460
4	84" Storm Drain Pipe	\$240 /LF	3,982 LF	\$955,175
5	Storm Drain Manhole	\$3,000 Each	16 Each	\$48,000
6	Prefab Reducers	\$4,500 Each	3 Each	\$13,500
7	Catch Basins & Laterals	\$4,000 Each	16 Each	\$64,000
8	36" Storm Drain Laterals	\$87 Each	420 Each	\$36,697
9	Junction Structures	\$15,000 Each	2 Each	\$30,000
			Total	\$2,733,826

## STORM DRAIN ALIGNMENT COST COMPARISONS

### NORTHERN/ORANGEWOOD STORM DRAIN PROJECT

3/18/98

Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue

Phase II, Sub-Phase B

Flood Control District of Maricopa County

Contract FCD 94-12

PHASE II

Sub-phase "B"

W/P # 94153.04

### 30% Alignment Analysis

Note: Only Items specific or additional to this alignment are included herein.

### Location: South Side Alignment

Based on MAG Specs Pay Width Pavement section 4" AC on 12" ABC

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Remove 15" PVC San Sewer	\$2 /LF	4,350 LF	\$8,700
2	Remove Sanitary Sewer Manholes	\$300 /EA	9 EA	\$2,700
3	Traffic Control	\$30,000 /Job	1 /Job	\$30,000
4	New 15" Sanitary Sewer	\$40 /LF	4,430 /LF	\$177,200
5	New Sanitary Sewer Manholes	\$2,400 /EA	10 /EA	\$24,000
6	Pvmt Replacement at Storm Sewer	\$20 /SY	14,032 /SY	\$280,640
7	Pvmt Replacement at Sanitary Sewer	\$20 /SY	3,010 /SY	\$60,200
Costs for this Alignment				\$583,440
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,317,266</u></b>

### Location: South Side Alignment

Based on Geotech Recomendation (Trench Slope Max. 1/2:1)

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Remove 15" PVC San Sewer	\$2 /LF	4,350 LF	\$8,700
2	Remove Sanitary Sewer Manholes	\$300 /EA	9 EA	\$2,700
3	Traffic Control	\$30,000 /Job	1 /Job	\$30,000
4	New 15" Sanitary Sewer	\$40 /LF	4,430 /LF	\$177,200
5	New Sanitary Sewer Manholes	\$2,400 /EA	10 /EA	\$24,000
6	Pvmt Replacement at Storm Sewer	\$20 /SY	25,450 /SY	\$509,000
7	Pvmt Replacement at Sanitary Sewer	\$20 /SY	3,010 /SY	\$60,200
Costs for this Alignment				\$811,800
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,545,626</u></b>

## STORM DRAIN ALIGNMENT COST COMPARISONS

### NORTHERN/ORANGEWOOD STORM DRAIN PROJECT

3/18/98

Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue

Phase II, Sub-Phase B

Flood Control District of Maricopa County

Contract FCD 94-12

PHASE II

Sub-phase "B"

W/P # 94153.04

### 30% Alignment Analysis

Note: Only Items specific or additional to this alignment are included herein.

Location: COG Standard Storm Drain Alignment (4'South of CL)

Based on MAG Specs Pay Width 4"AC on 12" ABC

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Median Curb/Gutter Remove & Replace	\$13.50 /LF	11,460 LF	\$154,710
2	Traffic Control	\$45,000 /Job	1 /Job	\$45,000
3	Pavement Replacement at Storm Sewer	\$20 /SY	5,420 /SY	\$108,400
4	Survey for Curb & Gutter Reconstruction	\$20,000 /EA	1 /EA	\$20,000
5	Sanitary Sewer thru Box Culvert	\$20,000 /EA	1 /EA	\$20,000
Costs for this Alignment				\$348,110
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,081,936</u></b>

Location: COG Standard Storm Drain Alignment (4'South of CL)

Based on Geotech Recomendation (Trench Slope Max. 1/2:1)

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Median Curb/Gutter Remove & Replace	\$14 /LF	11,460 LF	\$154,710
2	Traffic Control	\$45,000 /Job	1 /Job	\$45,000
3	Pavement Replacement at Storm Sewer	\$20 /SY	13,584 /SY	\$271,680
4	Survey for Curb & Gutter Reconstruction	\$20,000 /EA	1 /EA	\$20,000
5	Sanitary Sewer thru Box Culvert	\$20,000 /EA	1 /EA	\$20,000
Costs for this Alignment				\$511,390
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,245,216</u></b>

## STORM DRAIN ALIGNMENT COST COMPARISONS

NORTHERN/ORANGEWOOD STORM DRAIN PROJECT  
 Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue  
 Phase II, Sub-Phase B  
 Flood Control District of Maricopa County

3/18/98

Contract FCD 94-12  
 PHASE II  
 Sub-phase "B"  
 W/P # 94153.04

30% Alignment Analysis

Note: Only Items specific or additional to this alignment are included herein.

Location: South Side Alignment  
Based on MAG Specs Pay Width Pavement section 8" AC on 9" ABC

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Remove 15" PVC San Sewer	\$2 /LF	4,350 LF	\$8,700
2	Remove Sanitary Sewer Manholes	\$300 /EA	9 EA	\$2,700
3	Traffic Control	\$30,000 /Job	1 /Job	\$30,000
4	New 15" Sanitary Sewer	\$40 /LF	4,430 /LF	\$177,200
5	New Sanitary Sewer Manholes	\$2,400 /EA	10 /EA	\$24,000
6	Pvmt Replacement at Storm Sewer	\$40 /SY	14,032 /SY	\$561,280
7	Pvmt Replacement at Sanitary Sewer	\$40 /SY	3,010 /SY	\$120,400
Costs for this Alignment				\$924,280
Strom Drain Costs Common to all Alignments				\$2,733,826
<b>Total</b>				<b>\$3,658,106</b>

Location: South Side Alignment  
Based on Geotech Recomendation (Trench Slope Max. 1/2:1)

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Remove 15" PVC San Sewer	\$2 /LF	4,350 LF	\$8,700
2	Remove Sanitary Sewer Manholes	\$300 /EA	9 EA	\$2,700
3	Traffic Control	\$30,000 /Job	1 /Job	\$30,000
4	New 15" Sanitary Sewer	\$40 /LF	4,430 /LF	\$177,200
5	New Sanitary Sewer Manholes	\$2,400 /EA	10 /EA	\$24,000
6	Pvmt Replacement at Storm Sewer	\$40 /SY	25,450 /SY	\$1,018,000
7	Pvmt Replacement at Sanitary Sewer	\$40 /SY	3,010 /SY	\$120,400
Costs for this Alignment				\$1,381,000
Strom Drain Costs Common to all Alignments				\$2,733,826
<b>Total</b>				<b>\$4,114,826</b>

## STORM DRAIN ALIGNMENT COST COMPARISONS

NORTHERN/ORANGEWOOD STORM DRAIN PROJECT  
 Glendale Avenue storm Drain - Agua Fria Freeway to 83rd Avenue  
 Phase II, Sub-Phase B  
 Flood Control District of Maricopa County

3/18/98

Contract FCD 94-12  
 PHASE II  
 Sub-phase "B"  
 W/P # 94153.04

30% Alignment Analysis

Note: Only items specific or additional to this alignment are included herein.

Location: COG Standard Storm Drain Alignment (4'South of CL)  
Based on MAG Specs Pay Width 8" AC on 9" ABC

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Median Curb/Gutter Remove & Replace	\$13.50 /LF	11,460 LF	\$154,710
2	Traffic Control	\$45,000 /Job	1 /Job	\$45,000
3	Pavement Replacement at Storm Sewer	\$40 /SY	5,420 /SY	\$216,800
4	Survey for Curb & Gutter Reconstruction	\$20,000 /EA	1 /EA	\$20,000
5	Sanitary Sewer thru Box Culvert	\$20,000 /EA	1 /EA	\$20,000
Costs for this Alignment				\$456,510
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,190,336</u></b>

Location: COG Standard Storm Drain Alignment (4'South of CL)  
Based on Geotech Recomendation (Trench Slope Max. 1/2:1)

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	AMOUNT
1	Median Curb/Gutter Remove & Replace	\$14 /LF	11,460 LF	\$154,710
2	Traffic Control	\$45,000 /Job	1 /Job	\$45,000
3	Pavement Replacement at Storm Sewer	\$40 /SY	13,584 /SY	\$543,360
4	Survey for Curb & Gutter Reconstruction	\$20,000 /EA	1 /EA	\$20,000
5	Sanitary Sewer thru Box Culvert	\$20,000 /EA	1 /EA	\$20,000
Costs for this Alignment				\$783,070
Strom Drain Costs Common to all Alignments				\$2,733,826
<b><u>Total</u></b>				<b><u>\$3,516,896</u></b>



Darrel E. Wood, P.E., R.L.S.  
Ashok C. Patel, P.E., R.L.S.  
James S. Campbell, P.E.  
Gordon W. R. Wark, P.E.  
Thomas R. Gettings, R.L.S.  
Bruce Friedhoff, P.E.  
Scott A. Nelson, R.L.S.  
Richard L. Hiner, P.E.  
Fredrick K. Schneider, P.E.  
Timothy A. Huval, P.E.  
Michael J. Sexton, R.L.S.  
Jack K. Moody, P.E.  
Leslie J. Kland, P.E.  
Carl Sitterley, R.L.S.  
Curtis L. Brown, P.E.

**MINUTES OF MEETING**

**PROJECT:** Glendale Avenue Storm Drain Phase II Sub-Phase B  
WP # 94153.04

**SUBJECT:** Storm Drain Alignment on Glendale Avenue

**DATE:** March 16, 1998

**ATTENDEES:** R.W. Shobe, FCDMC  
Ash Patel, Wood/Patel  
James Taillon, Wood/Patel



This meeting was to review the recommended alignment from the City of Glendale with R.W. Shobe. The alignment recommended by Wood/Patel in the concept routing study of 4' feet south of the monument line of Glendale Avenue is the standard location for storm drains based on City of Glendale's standard detail G-313. The City however would like to try to avoid disrupting traffic flow in both directions during construction and avoid having to reconstruct the existing medians along this alignment. Wood/Patel indicated that, as a courtesy to Glendale, they would try to maintain the storm drain alignment on the south side of Glendale Avenue all the way from the Aqua Fria Freeway to 83<sup>rd</sup> Avenue. A storm drain and sanitary sewer line conflict occurs in the area between 89<sup>th</sup> Avenues and 83<sup>rd</sup> Avenues. The City is going to look into the possibility of relocating the 15" sanitary sewer to the north side of Glendale Avenue to provide an open corridor for this storm drain alignment.

R.W. indicated that he would like to see some cost comparisons based on Wood/Patel's recommended concept routing of the alignment and the cost of the south side of Glendale Avenue alignment, including the cost of relocating the sanitary sewer from 89<sup>th</sup> to 83<sup>rd</sup> Avenue. Wood/Patel also suggested that an alternate location for the storm drain may be available. Continental Homes is working on the land use for all of the land north of Glendale Avenue adjacent to this project. Wood/Patel suggested that it maybe possible to locate this storm drain north of the existing north right-of-way line in an easement along this entire corridor immediately west of 83<sup>rd</sup> Avenue. R.W. indicated that he would get the district's right away people to look into the cost for that easement, based on the 20' foot width. Wood/Patel will check into this alignment and determine if there are any conflicts and will check with Continental Home's Engineer, Coe & Van Loo, to determine whether or not this would be acceptable to them. Wood/Patel will also contact the City of Glendale and get their input on the possibility of accepting this alignment. Wood/Patel also suggested if the alignment on the north side of Glendale Avenue was acceptable and whether it will be possible to use cast-in-place pipe along this alignment, thereby saving additional money. If this is acceptable to all parties, Wood/Patel will determine if cast-in-place pipe would be acceptable to the City of Glendale. Wood/Patel will also check with the Geotechnical Technical Engineer to see if the soils in this area will allow for cast-in-place pipe construction.

Based on the problems associated with determining an alignment with a 30% submittal, Wood/Patel does not anticipate requiring an extension to the project schedule, however, R.W.

indicated that as work on the plans progresses, he may be willing to allow an extension based on the problems with the alignment.

A decision was made on the analysis of Phase II, Sub-Phase C at Grand Avenue. Wood/Patel has indicated to R.W. that it will be necessary to analyze the storm drain alignment in Grand Avenue from the southwest corner of the basin along Grand Avenue to Northern Avenue to determine whether or not any utility conflicts occur along this alignment and whether or not the future storm drain north of Grand Avenue and 67<sup>th</sup> Avenue can tie into the proposed drain by ADOT. To this point all that has been is an analysis of whether or not the pipe size would be capable of carrying anticipated flows, the profile checks have not been made. R.W. indicated that there is still money available from the first Phase for ADOT coordination. He authorized Wood/Patel to evaluate the storm drain hydraulics/utility conflicts along Grand Avenue using the previously approved funds in Job #94153.00.

Kent McClain from Maricopa County Department of Transportation wants to know from Wood/Patel where SRP flows are going to be coming into the Northern Avenue storm drains, including quantification of flow values. Wood/Patel will provide this information to them.

ACP/ct

cc: Attendees

MEMOS\94153mm-m16

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: City of Glendale

5850 W Glendale Ave

Glendale, Az 85301

DATE: March 10, 1998

JOB NO. 94153.04

ATTENTION: Dan Sherwood

RE: Northern/Orangewood Storm Drain

Glendale Ave Storm Drain, Phase II, Sub-Phase B

Preliminary Alignment

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other :

COPIES	DATE	NO.	DESCRIPTION
2		11	Full Size Blueline Plans with Preliminary Storm Drain Alignment

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

REMARKS:.

Dan,

Per our meeting of March 9, 1998, attached are two sets of Bluelines showing the proposed alignment for the Glendale Ave. Storm Drain. Also shown on the plans are the limits of the 15" sanitary sewer which will require relocation. Please forward one set of Bluelines to Grant Anderson. If you have any questions, comments or require additional information, please let me know. Unless we hear differently from you, we will proceed with the 30% plans with the alignment shown on these plans.

COPY TO: Project File, RW Shobe - FCDMC, Grant Anderson - COG

SIGNED: James Taillon



Darrel E. Wood, P.E., R.L.S.  
 Ashok C. Patel, P.E., R.L.S.  
 James S. Campbell, P.E.  
 Gordon W. R. Wark, P.E.  
 Thomas R. Gettings, R.L.S.  
 Bruce Friedhoff, P.E.  
 Scott A. Nelson, R.L.S.  
 Richard L. Hiner, P.E.  
 Fredrick K. Schneider, P.E.  
 Timothy A. Huval, P.E.  
 Michael J. Sexton, R.L.S.  
 Jack K. Moody, P.E.  
 Leslie J. Kland, P.E.  
 Carl Sitterley, R.L.S.  
 Curtis L. Brown, P.E.

**MINUTES OF MEETING**

**PROJECT:** Glendale Avenue Storm Drains  
 Phase II  
 WP #94153.04

**SUBJECT:** Storm Drain Alignment on Glendale Avenue  
 from the Aqua Fria Freeway to 83<sup>rd</sup> Avenue

**DATE:** March 9, 1998

**ATTENDEES:** Grant Anderson City of Glendale  
 Dan Sherwood City of Glendale  
 Ash Patel Wood/Patel  
 James Tallon Wood/Patel

DT

1. As discussed previously with Dan Sherwood, the storm drain alignment as proposed immediately south of centerline of Glendale Avenue is not the favored alignment of the City of Glendale. Dan Sherwood wants Wood/Patel to determine if the storm drain could be located on the east bound (south) side of Glendale Avenue to avoid disturbing the medians affecting traffic in both directions.
2. Wood/Patel determined that the storm drain could be constructed in a corridor between the existing water and sewer lines in the south half of Glendale Avenue from the Agua Fria Freeway outfall to approximately 89<sup>th</sup> Avenue. At 89<sup>th</sup> Avenue the existing waterline and sewer line converge to be approximately 18' feet in horizontal separation. At this location the storm drain is 84" inches in diameter and based information from the Geotechnical Engineer, the waterline would fall within the limits of the trench slopes. After discussing this with the City of Glendale, the City determined that if necessary the 15"inch sanitary sewer on the south side of Glendale Avenue may need to be relocated to create a useable corridor for the storm drain construction from 89<sup>th</sup> Avenue to 83<sup>rd</sup> Avenue. The City of Glendale will determine the alignment and grade and limits of the relocated sanitary sewer. This relocation plan for this line will probably be prepared by the City in house.
3. Wood/Patel will prepare preliminary alignment plans showing their proposed storm drain and the area in which the sanitary sewer would need to be relocated. Wood/Patel will provide this information to both Dan Sherwood and Grant Anderson.

cc: R. W. Shobe, FCDMC

NOTES/94153.04-m

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 3

.....  
DATE: March 6, 1998  
.....

.....  
TIME: 9:07 AM  
.....

TO: RW Shobe (Copy of original sent to Richard Harris)

COMPANY: FCDMC

FAX NO.: 506-4601

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph B      JOB NO.: 94153.04

SUBJECT: Storm Drain Hydraulics

.....  
**COMMENTS:**  
.....

Richard,

.....  
We are in the process of preparing 30% plans for the Glendale Ave  
Storm Drain from the Agua Fria Freeway to 83<sup>rd</sup> Ave. (N/O Phase II,  
Sub Phase B). On January 30, 1998, we provided you with a copy  
of the preliminary hydraulics for this phase. At this time, we would like you  
to review the hydraulics so that we can address any comments you  
may have early on in the design process. If you have any questions or  
require additional information, please let me know.  
.....

Thank You,

James Taillon

.....  
CC: File  
.....

RW Shobe

**FAX TRANSMITTAL**

**WOOD/PATEL  
ASSOCIATES**

Civil Engineers  
Hydrologists  
Land Surveyors

PAGE 1 OF 3

DATE: March 6, 1998

TIME: 9:07 AM

TO: Richard Harris

COMPANY: FCDMC

FAX NO.: 506-4601

FROM: James Taillon

PROJECT: Northern/Orangewood Ph II, Sub Ph B JOB NO.: 94153.04

SUBJECT: Storm Drain Hydraulics

**COMMENTS:**

Richard,

We are in the process of preparing 30% plans for the Glendale Ave Storm Drain from the Agua Fria Freeway to 83<sup>rd</sup> Ave. (N/O Phase II, Sub Phase B). On January 30, 1998, we provided you with a copy of the preliminary hydraulics for this phase. At this time, we would like you to review the hydraulics so that we can address any comments you may have early on in the design process. If you have any questions or require additional information, please let me know.

Thank You,

James Taillon

CC: File

RW Shobe

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Coe & Van Loo Consultants, Inc.

4550 N. 12<sup>th</sup> Street

Phoenix, Az 85014

DATE: March 5, 1998

JOB NO. 94153.02

ATTENTION: Paul Siders

RE: Northern/Orangewood Storm Drain

Northern/Butler Phase II - Sub-Phase A

WE ARE SENDING YOU • Attached ○ Under separate cover via PICK-UP the following items:

- Conceptual drawings    ○ Design Plans (11x17)    ○ Plans (Full Size)    ○ Bluelines    ○ Specifications
- Copy of letter        • Drainage Report    ○ Other :

COPIES	DATE	NO.	DESCRIPTION
1		1	Original Northern/Orangewood Storm Drain Concept Routing Study

THESE ARE TRANSMITTED as checked below:

- For approval                      ○ Approved as submitted                      ○ Approved as noted
- For your use                        ○ As requested                                      ○ For review and comment

REMARKS:.

Paul,

Attached is the original drainage report for the Northern/Orangewood study per your request.

Please note that the study is for a 2 year, 6 hour storm. Flow splits and diversions are based on the 2 year, 6 hour flows. Therefore, this model can not be modified for 100 year flows by simply modifying the rainfall depth.

Please return this report by Monday, March 9<sup>th</sup>.

Thank You

COPY TO: Project File

SIGNED: James Taillon

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: February 17, 1998	JOB NO. 94153.04
ATTENTION: R.W. Shobe	
RE: Northern/Orangewood Storm Drain	
Glendale Ave AFF Channel to 83 <sup>rd</sup> Ave Sub-Phase II B	
Pothole Location Request	

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings     Design Plans (11x17)     Plans (Full Size)     Bluelines     Specifications
- Copy of letter     Drainage Report     Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		1	Pothole Request
1		1	Original 4 Scale plans with pothole locations delineated

THESE ARE TRANSMITTED as checked below:

- For approval     Approved as submitted     Approved as noted
- For your use     As requested     For review and comment

REMARKS:.

Please return plans with comments.

Thank You

COPY TO: Project File \_\_\_\_\_ SIGNED: James Taillon

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: January 29, 1998

JOB NO. 94153.04

ATTENTION: Richard Harris

RE: Northern/Orangewood Storm Drain

Glendale Ave AFF Channel to 83<sup>rd</sup> Ave Sub-Phase II B

30% Preliminary Storm Drain Hydraulics

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings  
  Design Plans (11x17)  
  Plans (Full Size)  
  Bluelines  
  Specifications  
 Copy of letter  
  Drainage Report  
  Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		1	Diskette with Storm Drain Hydraulics
1			HEC-1 Output File
1		1	HEC-1 Schematic with flows

THESE ARE TRANSMITTED as checked below:

- For approval  
  Approved as submitted  
  Approved as noted  
 For your use  
  As requested  
  For review and comment

REMARKS:.

COPY TO: Project File

SIGNED: James Taillon

**STORM DRAIN HYDRAULIC GRADE LINE COMPUTATION WORKSHEET**

Project: Northern/Drangewood Storm Drain Phase II B Glendale Ave - City of Glendale

Engineer: JGT File Name: q:\northern\Ph2\30\plans\glen30pr.xls 1/29/98

Description: Computation of HGL & EGL for storm drain system

Reference: Drainage Design Manual for Maricopa County, Arizona  
Volume II, Hydraulics, January 1996

Last Revised: January 1998

Notes:

- This spreadsheet is developed to compute storm drain hydraulic grade line based on the above mentioned reference. All Equations used and minor loss coefficients shall be referred to this reference.
- The blue areas are user input blocks. The white areas are computed values.
- The recommended flow type for storm drain systems by the reference is pressure flow. Therefore, open channel flow computation is only an approximation here. The hydraulic grade line at the outfall is assumed to be the invert elevation plus the pipe diameter. If the tailwater elevation is different from this value, the user should change this number manually.
- The station is located at the immediate downstream of a change point.
- If the number of rows of the spreadsheet is not enough for a project, the user can copy more rows to the bottom of the spreadsheet.
- This spreadsheet calculates suggested pipe diameters with increment of 150 mm (6 inches). User can select different values than the suggested.
- Manning's n values can be selected from Table 4.1.
- The Transition Loss Column (Kt) is the summation of Kt values for each section, and the individual Kt values are from Tables 4.2 to 4.4 based on the transition types: a) gradual enlargement, b) sudden enlargement, c) contraction, the D2/D1 ratio, the velocity in, and other related information on these tables.
- The Bend Loss Column is the summation of Kb values for each section including manhole losses, Bend Losses and Lateral Flow Losses. The individual bend Kb values are from Figure 4.7.
- A column is provided for minor losses other than the types considered in the spreadsheet. The user should input these values directly.
- If users find any error or have any suggestion, please contact Wood/Patel & Associates.

**Glendale Avenue - AFF Outfall Channel to 83rd Avenue**

Storm Sewer Line Station Location	Pipe #	Pipe Length (ft)	Pipe Diameter		n	Natural Ground Elevation (ft)	Invert Elev. (ft)	Design Q (cfs)	Transition Loss Coeff. Sum(Kt)	Bend Loss Coefficient				D2/D1	Vel. (ft/s)	Full Area (ft²)	V²/2g (ft)	K	Sf (ft/ft)	Losses					Total Losses (ft)	Hydraulic Grade Line Elevation (ft)	Energy Grade Line Elevation (ft)	Pressure Flow Check	"Overflow" Check	Comments	Depth to Hydraulic Grade Line (ft)	Depth to Invert (ft)		
			Sheet Suggested (in)	User Selected (in)						Loss Due to Bend	Loss Due to Lat Flow	Number of MH	Loss Due to Manholes							hf (ft)	ht (ft)	hb (ft)	hj (ft)	Others (ft)										
Outfall @ AFF	10+57.36	0	0	108	0.013	1066.00	1062.00	487	0.00	0.00	0.00	0	0.00	0.00	1.00	7.66	63.62	0.910	0.0109	0.0034	0.470	0.000	0.000	0.000	0.000	0.000	0.000	1061.00	1061.91	OK	OK		5.00	14.00
AFF to ADOT MH	11+07.36	41a	140	102	108	0.013	1066.00	1052.33	487	0.00	0.00	1	0.05	0.05	1.00	7.66	63.62	0.910	0.0109	0.0034	0.470	0.000	0.041	0.000	0.000	0.000	0.470	1061.21	1062.12	OK	OK		4.79	13.67
MAFF to ADOT Subout	11+82.36	41b	75	102	108	0.013	1066.00	1052.51	487	0.00	0.84	0	0.00	0.84	1.00	7.66	63.62	0.910	0.0109	0.0034	0.252	0.000	0.582	0.000	0.000	0.293	1061.37	1062.28	OK	OK		4.63	13.49	
Subout to 97th Ave	13+21.00	41c	138.64	102	108	0.013	1065.60	1052.84	487	0.10	0.00	1	0.05	0.05	1.00	7.66	63.62	0.910	0.0109	0.0034	0.466	0.001	0.041	0.000	0.000	1.048	1062.16	1063.07	OK	OK		3.44	12.76	
97th to 95th Ave	26+42.00	41d	1321	102	108	0.013	1068.00	1058.00	485	0.00	0.00	3	0.14	0.29	1.00	7.62	63.62	0.903	0.0109	0.0033	4.401	0.000	0.258	0.000	0.000	4.443	1064.20	1065.11	OK	OK		3.80	12.00	
95th to 93rd Ave	39+63.19	42a	1321.19	96	96	0.013	1075.00	1060.45	455	0.10	0.00	3	0.19	0.39	1.13	9.05	50.27	1.272	0.0109	0.0055	7.260	0.037	0.497	0.000	0.000	7.518	1067.38	1068.65	OK	OK		7.62	14.55	
93rd to 91st Ave	52+84.38	42b	1321.19	96	90	0.013	1077.60	1065.00	454	0.00	0.00	3	0.25	0.35	1.07	10.28	44.18	1.640	0.0109	0.0077	10.199	0.000	0.567	0.000	0.000	10.733	1072.17	1073.81	OK	OK		5.43	12.60	
91st to 89th Ave	66+12.02	43a	1327.64	90	90	0.013	1084.00	1069.46	395	0.10	0.00	3	0.19	0.46	1.00	8.94	44.18	1.241	0.0109	0.0058	7.758	0.038	0.566	0.000	0.000	8.325	1076.65	1077.89	OK	OK		7.35	14.54	
89th to 87th Ave	79+39.66	43b	1327.64	90	84	0.013	1089.60	1074.00	393	0.00	0.00	3	0.24	0.34	1.07	10.21	38.48	1.619	0.0109	0.0084	11.095	0.000	0.555	0.000	0.000	11.699	1081.90	1083.52	OK	OK		7.70	15.60	
87th to 85th Ave	92+66.94	43c	1327.26	90	84	0.013	1092.40	1078.48	388	0.00	0.00	3	0.24	0.34	1.00	10.08	38.48	1.578	0.0109	0.0081	10.812	0.000	0.532	0.000	0.000	11.367	1087.39	1088.97	OK	OK		5.01	13.92	
85th to 83rd Ave	105+94.22	43d	1327.26	90	84	0.013	1095.80	1083.00	386	0.00	0.00	3	0.23	0.33	1.00	10.03	38.48	1.562	0.0109	0.0081	10.700	0.000	0.522	0.000	0.000	11.232	1092.79	1094.35	OK	OK		3.01	12.80	
83rd to Myrtle Ave	119+03.98	44a	1309.76	72	72	0.013	1103.00	1087.72	220	0.10	1.04	3	0.14	1.93	1.17	7.78	28.27	0.940	0.0109	0.0060	7.805	0.003	1.815	0.000	0.000	8.327	1097.46	1098.40	OK	OK		5.54	15.28	
Myrtle to Orangewood	132+13.74	44b	1309.76	72	72	0.013	1106.00	1092.43	216	0.00	0.00	3	0.14	0.24	1.00	7.64	28.27	0.906	0.0109	0.0057	7.523	0.000	0.214	0.000	0.000	9.342	1102.73	1103.63	OK	OK		3.27	13.57	
Orangewood to 79th Ave	158+53.74	4	2640	72	66	0.013	1113.60	1097.45	159	0.10	1.04	5	0.17	1.46	1.09	6.69	23.76	0.695	0.0109	0.0050	13.069	0.008	1.018	0.000	0.000	13.283	1109.07	1109.76	OK	OK		4.53	16.15	
79th to 77th Ave	171+73.74	5a	1320	66	60	0.013	1116.90	1100.22	124	0.10	0.00	3	0.09	0.29	1.10	6.32	19.63	0.619	0.0109	0.0050	6.607	0.025	0.181	0.000	0.000	7.633	1113.16	1113.78	OK	OK		3.74	16.68	
77th to 75th Ave	184+93.74	5b	1320	60	60	0.013	1121.30	1103.00	96	0.10	0.00	3	0.06	0.26	1.00	4.89	19.63	0.371	0.0109	0.0030	3.960	0.005	0.095	0.000	0.000	4.167	1115.41	1115.78	OK	OK		5.89	18.30	
75th to 73rd Ave	198+13.74	6a	1320	54	54	0.013	1124.00	1105.50	83	0.10	0.00	3	0.06	0.16	1.11	5.22	15.90	0.423	0.0109	0.0039	5.193	0.018	0.069	0.000	0.000	5.293	1117.81	1118.24	OK	OK		6.19	18.50	
73rd to 71st Ave	211+33.74	6b	1320	48	48	0.013	1126.40	1108.00	50	0.00	0.00	3	0.04	0.24	1.13	3.98	12.57	0.246	0.0109	0.0027	3.532	0.000	0.058	0.000	0.000	3.619	1119.68	1119.92	OK	OK		6.72	18.40	
71st to 69th Ave	224+53.74	7	1320	42	42	0.013	1130.40	1113.00	50	0.10	0.00	3	0.06	0.06	1.14	5.20	9.62	0.419	0.0109	0.0055	7.199	0.046	0.026	0.000	0.000	7.257	1122.82	1123.24	OK	OK		7.58	17.40	
69th to 67th Ave	237+73.74	7a	1320	66	66	0.013	1133.40	1118.00	179	0.34	0.00	3	0.13	0.13	0.61	7.53	23.76	0.881	0.0109	0.0063	8.282	0.191	0.117	0.000	0.000	8.355	1128.18	1127.06	OK	OK		7.22	15.40	
67th to 65th Ave	244+33.74	8	660	66	66	0.013	1138.00	1119.00	108	0.10	0.00	1	0.02	0.32	1.00	4.55	23.76	0.321	0.0109	0.0023	1.507	0.015	0.101	0.000	0.000	1.615	1127.73	1128.05	OK	OK		10.27	19.00	
65th to Friar Dr	257+53.74	9	1320	54	60	0.013	1146.00	1124.00	108	0.10	1.04	3	0.07	1.11	1.10	5.50	19.63	0.470	0.0109	0.0038	5.012	0.000	0.522	0.000	0.000	5.129	1129.97	1130.44	OK	OK		16.03	22.00	
Friar Dr to 45th Ave	264+13.74	10	660	54	60	0.013	1142.00	1126.00	108	0.00	1.04	1	0.02	1.06	1.00	5.50	19.63	0.470	0.0109	0.0038	2.506	0.000	0.500	0.000	0.000	3.028	1131.63	1132.10	OK	OK		10.37	16.00	
45th to Northern Ave	277+33.74	11	1320	48	48	0.013	1145.00	1131.00	71	0.10	0.00	3	0.07	0.07	1.25	5.65	12.57	0.496	0.0109	0.0054	7.121	0.026	0.037	0.000	0.000	7.621	1135.33	1135.82	OK	OK		9.67	14.00	
65th to 67th Ave	290+53.74	12	1320	54	54	0.013	1143.00	1135.50	111	0.00	0.00	3	0.11	0.11	0.89	6.98	15.90	0.756	0.0109	0.0070	9.287	0.000	0.086	0.000	0.000	9.350	1139.34	1140.09	OK	OK		3.66	7.50	

WOOD, PATEL & ASSOC., INC.

LETTER OF TRANSMITTAL

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO: Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, Az 85009

DATE: January 21, 1998

JOB NO. 94153.04

ATTENTION: RW Shobe

RE: Northern/Orangewood Storm Drain

Glendale Avenue Sub-Phase B

Preliminary Hydrology

WE ARE SENDING YOU • Attached ○ Under separate cover via PICK-UP the following items:

- Conceptual drawings    ○ Design Plans (11x17)    ● Plans (Full Size)    ○ Bluelines    ○ Specifications
- Copy of letter    ○ Drainage Report    ● Other : See Below

COPIES	DATE	NO.	DESCRIPTION
1		1	Full Size Blueline of HEC-1 Schematic with Flows
1			HEC-1 Output File Printout

THESE ARE TRANSMITTED as checked below:

- For approval    ○ Approved as submitted    ○ Approved as noted
- For your use    ● As requested    ● For review and comment

REMARKS:.

COPY TO: Project File

SIGNED: James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

Ricker, Atkinson, McBee & Associates, Inc.

2105 South Hardy Drive, Suite 203

Tempe, Arizona 85282

DATE: December 11, 1997	JOB NO. 94154.04
ATTENTION: Ken Ricker	
RE: Northern/Orangewood Phase II B	
Glendale Avenue Storm Drain	

WE ARE SENDING YOU  Attached  Under separate cover via PICK-UP the following items:

- Conceptual drawings
- Design Plans (11x17)
- Plans (Full Size)
- Bluelines
- Specifications
- Copy of letter
- Drainage Report
- Other\_(Files) \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1		1	Copy of Phase B (Sheets 1, 2, 6 thru 10)

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- Approved as submitted
- As requested
- Approved as noted
- For review and comment

REMARKS: Ken,

Attached is a copy of the next phase of Northern/Orangewood with boring hole locations.

Please let me know if you require any additional information in order to get started.

Thank You

COPY TO: Project File

SIGNED: James Taillon



**KINDER MORGAN**  
ENERGY PARTNERS, L.P.

RECEIVED

MAY 11 1998

WOOD, PATEL &  
ASSOCIATES

SFPP, L.P.  
Operating Partnership

May 7, 1998

ENG 4-2-1 (930)  
Reference #98-157

*James*

Carol Taylor / James Taillon  
Wood, Patel & Associates  
1550 East Missouri  
Suite 203  
Phoenix, AZ. 85014

**Re: Northern/ Orangewood Storm Drain Phase II,  
Subphase B Glendale Ave. Storm Drain**

Dear Ms. Taylor / Mr. Taillon

In reply to the letter dated April 29, 1998. This is to advise you that we do not have any facilities in the vicinity of the proposed project.

Sincerely yours,



D. R. Quinn

DRQ/rah

H:rah98-157

**CHECKLIST - UTILITY CONFLICT NOTIFICATION**

**CITY OF GLENDALE AND PEORIA**

Project Name: N/O Storm Drain Phase II WP# 94153.04  
Subphase B

Plans Submitted: 30% Submittal Construction Plans

UTILITY	DATE DELIVERED/MAILED	DATE RECEIVED
<input checked="" type="checkbox"/> AT & T CHC Engineering Inquiry	<i>Mail</i> 5-1-98	
<input checked="" type="checkbox"/> Cox Communications Angie Hardesty Engineering Department	<i>acc</i> 5-1-98	
<input checked="" type="checkbox"/> El Paso Natural Gas Bill Ward	<i>acc</i> 5-1-98	
<input checked="" type="checkbox"/> MCI Kent Pilcher	<i>Mail</i> 5-1-98	
<input checked="" type="checkbox"/> Salt River Project Sylvia Alvarado	<i>acc</i> 5-1-98	
<input checked="" type="checkbox"/> Santa Fe Pacific Pipeline Co. Don Quinn	<i>Mail</i> 5-1-98	
<input checked="" type="checkbox"/> Southwest Gas <del>Lisa Powers</del> <i>Dominique Mitchell</i>	<i>acc</i> 5-1-98	
<input checked="" type="checkbox"/> SRVWUA Bob Mauer	<i>acc</i> 5-1-98	
<input checked="" type="checkbox"/> US WEST Keith Nicholson <i>Lou Saucedo</i>	<i>acc</i> 5-1-98	

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

T&T

2535 EAST 40TH AVENUE, ROOM C-18

DENVER, CO 80205

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: CHC Engineering Inquiry

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

UTILITY CONFLICT REVIEW NOTIFICATION

WE ARE SENDING YOU  Attached  Under separate cover via U.S. MAIL the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

REMARKS: PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST.

PLEASE NOTIFY US OF YOUR CONCLUSIONS. IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

COPY TO: \_\_\_\_\_

SIGNED: Carol Taylor/James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

ACI TELECOMMUNICATIONS

27826 193rd Avenue

Wittmann, AZ 85361

DATE: April 30, 1998	JOB NO. 94153.04
ATTENTION: Mr. Kent Pilcher	
RE: Northern/Orangewood Storm Drain Phase II, Subphase B	
Glendale Avenue Storm Drain	
<b>UTILITY CONFLICT REVIEW NOTIFICATION</b>	

WE ARE SENDING YOU  Attached  Under separate cover via U.S. Mail the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

REMARKS:

PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST AND NOTIFY US OF YOUR CONCLUSIONS.

COPY TO:

SIGNED: Carol Taylor/James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 29, 1998

JOB NO. 94153.04

ATTENTION: Mr. Don Quinn

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

**UTILITY CONFLICT REVIEW NOTIFICATION**

TO:

Santa Fe Pacific Pipeline Co.

1100 Town & Country Road

Orange, CA 92868

WE ARE SENDING YOU  Attached  Under separate cover via U.S. MAIL the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

REMARKS:

Please review the attached plans for any utility conflicts that may exist and notify us of your conclusions.

COPY TO:

SIGNED: Carol Taylor/James Tailon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

S WEST COMMUNICATIONS

10220 North 25th Avenue, Suite 100

Phoenix, AZ 85021

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Mr. Lou Saucedo

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

UTILITY CONFLICT REVIEW NOTIFICATION

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
2 SETS	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

REMARKS: PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST.

PLEASE NOTIFY US OF YOUR CONCLUSIONS. PLEASE SIGN AND RETURN THIS TRANSMITTAL FOR RECEIPT VERIFICATION.

COPY TO:

SIGNED: Carol Taylor/James Taillon

**LETTER OF TRANSMITTAL**

**WOOD, PATEL & ASSOC., INC.**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Mr. Bob Maurer

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

*UTILITY CONFLICT REVIEW NOTIFICATION*

SRVWUA - PAB 106

521 North Project Drive

Phoenix, AZ 85072-2025

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

**REMARKS:**

PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST AND NOTIFY US OF YOUR CONCLUSIONS. THANK YOU.

COPY TO: \_\_\_\_\_

SIGNED: Carol Taylor/James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 30, 1998	JOB NO. 94153.04
ATTENTION: Dominique Mitchell	
RE: Northern/Orangewood Storm Drain Phase II, Subphase B	
Glendale Avenue Storm Drain	
UTILITY CONFLICT REVIEW NOTIFICATION	

TO:  
 Southwest Gas Corporation  
 South 43rd Avenue, Mail Station 420-586  
 Phoenix, AZ 85009

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

For approval       Approved as submitted       Approved as noted  
 For your use       As requested       For review and comment

REMARKS:  
 PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST. PLEASE NOTIFY  
 US OF YOUR CONCLUSIONS. IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

COPY TO: \_\_\_\_\_

SIGNED: Carol Taylor/James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Ms. Sylvia Alvarado

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

UTILITY CONFLICT REVIEW NOTIFICATION

TO: Salt River Project - WVS208

221 North 79th Avenue

Phoenix, AZ 85072-2025

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

- Shop drawings       Prints       Plans       Samples       Specifications
- Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted
- For your use       As requested       For review and comment

REMARKS: PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST AND NOTIFY US OF YOUR CONCLUSIONS.

COPY TO:

SIGNED: Carol Taylor/James Taillon

# LETTER OF TRANSMITTAL

## WOOD, PATEL & ASSOC., INC.

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Mr. Bill Ward

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

*UTILITY CONFLICT REVIEW NOTIFICATION*

TO:  
El Paso Natural Gas

315 South 48th Street

Phoenix, AZ 85044

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

- |   |  |                                |                                  |   |
|---|--|--------------------------------|----------------------------------|---|
| <input type="checkbox"/> Shop drawings  | <input checked="" type="checkbox"/> Prints | <input type="checkbox"/> Plans | <input type="checkbox"/> Samples | <input type="checkbox"/> Specifications |
| <input type="checkbox"/> Copy of letter | <input type="checkbox"/> Change Order      | <input type="checkbox"/> _____ |                                  |   |

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> For approval            | <input type="checkbox"/> Approved as submitted | <input type="checkbox"/> Approved as noted                 |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> As requested          | <input checked="" type="checkbox"/> For review and comment |

REMARKS: PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST AND NOTIFY US OF YOUR CONCLUSIONS.

COPY TO: \_\_\_\_\_

SIGNED: Carol Taylor/James Taillon

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

Cox Communications-Engineering Department

115 North 51st Avenue

Phoenix, AZ 85043

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Ms. Angie Hardesty

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

**UTILITY CONFLICT REVIEW NOTIFICATION**

WE ARE SENDING YOU  Attached  Under separate cover via ACE DELIVERY the following items:

- Shop drawings       Prints       Plans       Samples       Specifications
- Copy of letter       Change Order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	4-30-98	1-16	30% Submittal Construction Plans

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Approved as noted
- For your use       As requested       For review and comment

REMARKS: PLEASE REVIEW THE ATTACHED FOR ANY UTILITY CONFLICTS THAT MAY EXIST, AND NOTIFY US OF YOUR CONCLUSIONS. IF YOU SHOULD HAVE ANY QUESTIONS PLEASE LET ME KNOW.

COPY TO: \_\_\_\_\_

SIGNED: Carol Taylor/James Taillon

**CITY OF GLENDALE**  
**UTILITY PLAN SUBMITTAL LOCATIONS**

**SRVWUA**

**Delivery:**

1521 North Project Drive

**Mail:**

P.O. Box 52025

Phoenix, AZ 85072-2025

**Contact: Bob Mauer**  
236-2962

**ARIZONA PUBLIC SERVICE**

**East of I-17:**

Attn: David McCasland - Phone: 371-6006

Delivery: 4612 East Bell Road  
Phoenix, AZ 85032

Mail: P.O. Box 53933, Sta. 4031  
Phoenix, AZ 85072-9207

**West of I-17:**

Attn: Phyllis Stuart

Delivery: 501 Northrop  
El Mirage, AZ 85335

Mail: P.O. Box 53933, Sta. 4618  
Phoenix, AZ 85072-9207  
493-4401

**U S WEST COMMUNICATIONS (2 Sets)**

**Phoenix - Main, Northeast, East, and South**

Southeast Engineering Office  
6350 South Maple, Room 125  
Tempe, AZ 85283

**Contact: Linda Salas**  
831-4771

**Phoenix - North, Northwest and West**

Northwest Liaison  
10220 N. 25th Avenue, Suite 100  
Phoenix, AZ 85021

**Contact: Keith Nicholson**  
395-2316

**AT&T**

**Contact:**

CHC Engineering Inquiry  
2535 East 40th Avenue, Room C-18  
Denver, CO 80205

**Please provide the following information:**

Name of street and cross-street.

Name of county.

**SOUTHWEST GAS**

9 South 43rd Avenue

Mail Station 420-586

Phoenix, AZ 85009

**Contact: Dominique Mitchell**  
Phone: 484-5306

**COX CABLE**

Engineering Department

115 North 51st Avenue

Phoenix, AZ 85043

**Contact: Carl McKay**  
352-5860  
(ext. 155)

**SALT RIVER PROJECT (Electric)**

**East of Central Avenue**

**Delivery:**

110 West Elliot, Tempe

**Mail:**

Mail Station TSC401  
P.O. Box 52025  
Phoenix, AZ 85072-2025

**Contact: Rosalie Quintana**  
236-8412

**West of Central Avenue**

**Delivery:** 221 North 79th Avenue

Mail: Mail Station WVS208  
P.O. Box 52025

Phoenix, AZ 85072-2025

**Contact:** Expeditor, Design or  
Sylvia Alvarado  
Gina Ferguson  
Phone: 236-4766

**MCI Telecommunications Corporation**

27826 North 193rd Avenue

Wittmann, AZ 85361

**Kent Pilcher**

222-1229

**City of Glendale**

5850 West Glendale Avenue

Glendale, AZ 85301

**Contact: Glen Compton**  
930-3630  
Water & Sewer

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: Mr. Lou Saucedo

**RECEIVED Northern/Orangewood Storm Drain Phase II, Subphase B**

**Glendale Avenue Storm Drain**

**UTILITY CONFLICT REVIEW NOTIFICATION**

JUN 17 1998

WOOD, PATEL & ASSOCIATES

TO: US WEST COMMUNICATIONS

10220 North 25th Avenue, Suite 100

Phoenix, AZ 85021

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VERIFICATION. UPON REVIEW OF THE PLANS I HAVE SEEN 4 CONFLICTS AND 20 POTENTIAL CONFLICTS. A FIELD INSPECTION SHOWED POTHOLES HAD BEEN TAKEN. NOT ALL ELEVATIONS FOR THE TELCO FACILITIES WERE SHOWN. I HAVE REPLYED THE PLANS WITH ALL POTENTIAL AND EXISTING CONFLICTS. ANY FURTHER INFORMATION YOU HAVE WOULD BE APPRECIATED TO PROCEED.

COPY TO: \_\_\_\_\_

*[Signature]* HARRISON GROUP  
 SIGNED: Carol Taylor/James Taillon US WEST CONTRACT  
 ENGINEERS

STA. 66+08

CONFLICT

STA. 87+22

u

STA. 93+07

u

STA. 96+09

u

## AREAS OF POSSIBLE CONFLICT

STA. 13+15 CATCH BASIN ELEVATION  
TELCO ELEVATION

STA. 19+75 CATCH BASIN AND TELCO  
ELEVATIONS

STA. 26+36 STORM DRAIN PIPE ELEVATION  
TELCO ELEVATION

STA 32+98 CATCH BASIN ELEVATION  
TELCO ELEVATION

STA 39+89 CATCH BASIN ELEVATION  
TELCO ELEVATION

STA 46+20 CATCH BASIN ELEVATION  
TELCO ELEVATION

91 STAKE CABLE 30' EAST OF CENTER LINE  
STORM DRAIN PIPE GOING NORTH  
2 CATCH BASIN ON EAST SIDE  
NEED ELEVATIONS  
TELCO CABLE GOING SOUTH  
NEEDS ELEVATION

STA 59+40 CATCH BASIN AND  
TELCO ELEVATIONS

STA 65+64 TELCO ELEVATION

STA 66+08 CATCH BASIN AND  
TELCO ELEVATIONS

STA 72+60 CATCH BASIN AND  
TELCO ELEVATIONS

STA 77+35 CATCH BASIN AND  
TELCO ELEVATIONS

STA 85+99 CATCH BASIN AND  
TELCO ELEVATIONS

STA 92+63 CATCH BASIN AND  
TELCO ELEVATIONS

STA 99+26 CATCH BASIN AND  
TELCO ELEVATIONS

83<sup>RD</sup> AVE. TEL. CABLE 30' W. OF 83 C.L.?  
AND NORTH OF GLENDALE  
TEL. CABLE 20' E. OF 83 C.L.  
AND SOUTH OF GLENDALE  
2 CABLES OMITTED.  
ELEVATIONS FOR CABLES  
AND CATCH BASINS

**WOOD, PATEL & ASSOC., INC.**

**LETTER OF TRANSMITTAL**

*Civil Engineers, Hydrologists, Land Surveyors*

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

AT&T

2535 EAST 40TH AVENUE, ROOM C-18

DENVER, CO 80205

DATE: April 30, 1998

JOB NO. 94153.04

ATTENTION: CHC Engineering Inquiry

RE: Northern/Orangewood Storm Drain Phase II, Subphase B

Glendale Avenue Storm Drain

UTILITY CONFLICT REVIEW NOTIFICATION

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REMARKS: PLEASE REVIEW THE ATTACHED PLANS FOR ANY UTILITY CONFLICTS THAT MAY EXIST.

PLEASE NOTIFY US OF YOUR CONCLUSIONS. IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

*NO CONFLICTS WITH AT&T CO*

*Stephen Mcendon*

COPY TO:

SIGNED: Carol Taylor/James Taillon

FORMSTRANAPS.GEN

LETTER OF TRANSMITTAL

WOOD, PATEL & ASSOC., INC.

Civil Engineers, Hydrologists, Land Surveyors

1550 East Missouri, Suite 203

Phoenix, AZ 85014

(602) 234-1344 • FAX 234-1322

TO:

El Paso Natural Gas

7815 South 48th Street

Phoenix, AZ 85044

DATE: April 30, 1998	JOB NO. 94153.04
ATTENTION: Mr. Bill Ward	
RE: Northern/Orangewood Storm Drain Phase II, Subphase B	
Glendale Avenue Storm Drain	
UTILITY CONFLICT REVIEW NOTIFICATION	

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*Mr Ward*

*No conflict w/*

*EPNG*

*5-4-98*

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COPY TO:

SIGNED: Carol Taylor/James Taillon