

# **NORMAL DEPTH CALCULATIONS**

## Worksheet for Trapezoidal Channel

### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Roughness Coefficient                      0.024  
Channel Slope                                0.00800    ft/ft  
Left Side Slope                                3.00    ft/ft (H:V)  
Right Side Slope                                3.00    ft/ft (H:V)  
Bottom Width                                10.00    ft  
Discharge                                      67.00    ft³/s

### Results

Normal Depth                                1.05    ft  
Flow Area                                    13.73    ft²  
Wetted Perimeter                            16.61    ft  
Hydraulic Radius                            0.83    ft  
Top Width                                    16.27    ft  
Critical Depth                                1.00    ft  
Critical Slope                                0.00923    ft/ft  
Velocity                                      4.88    ft/s  
Velocity Head                                0.37    ft  
Specific Energy                                1.42    ft  
Froude Number                                0.94  
Flow Type                                      Subcritical

Freeboard

Subcritical

$$F_b = \frac{1}{2} + \frac{V^2}{2g}$$

$$= 0.5 + \frac{4.88^2}{64.4}$$

$$= 0.87'$$

$$\text{Min } F_b = 1.0'$$

### GVF Input Data

Downstream Depth                            0.00    ft  
Length                                        0.00    ft  
Number Of Steps                                0

Min Channel depth  
= 2.05'

### GVF Output Data

Upstream Depth                                0.00    ft  
Profile Description  
Profile Headloss                                0.00    ft  
Downstream Velocity                            Infinity    ft/s  
Upstream Velocity                                Infinity    ft/s  
Normal Depth                                1.05    ft  
Critical Depth                                1.00    ft  
Channel Slope                                0.00800    ft/ft

VTN Consulting

## Worksheet for Trapezoidal Channel

### GVF Output Data

Critical Slope

0.00923 ft/ft

VTN Consulting

## Cross Section for Trapezoidal Channel

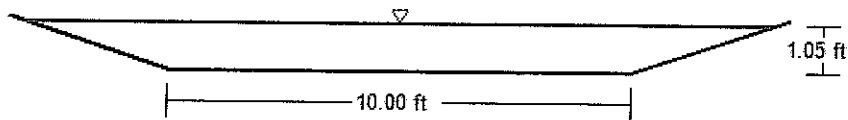
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

|                       |                          |
|-----------------------|--------------------------|
| Roughness Coefficient | 0.024                    |
| Channel Slope         | 0.00800 ft/ft            |
| Normal Depth          | 1.05 ft                  |
| Left Side Slope       | 3.00 ft/ft (H:V)         |
| Right Side Slope      | 3.00 ft/ft (H:V)         |
| Bottom Width          | 10.00 ft                 |
| Discharge             | 67.00 ft <sup>3</sup> /s |

### Cross Section Image



V: 1  
H: 1

# **HEADWATER DEPTH CALCULATION**

**FACILITY: Existing 42" RCP in Hammett Park Ave****HYDROPAC FOR PIPE CULVERT**

| INPUT           |              | OUTPUT           |           |
|-----------------|--------------|------------------|-----------|
| Pipe diameter   | 42 in        | INLET CTRL HW:   |           |
| Number of pipes | 1            | beveled edge     | 4.08 ft   |
| Slope           | 0.0200 ft/ft | sq edge headwall | 4.35 ft   |
| Manning's n     | 0.013        | thin edged proj  | 4.89 ft   |
| Culvert length  | 1000 ft      | OUTLET CTRL HW   | -11.46 ft |
| Discharge       | 67 cfs       | velocity         | 7.0 fps   |
|                 |              | critical depth   | 2.51 ft   |

**RESULTS**

Max HW= 5.3 ft  
 Actual HW= 4.3 ft

**Notes:**

- 1: Max HW is 5-feet for pipes with diameter of 36-inches or less and 1.5 times the pipe diameter for pipes with diameters greater than 36-inch .
- 2: If Discharge is greater than or equal to 500-cfs the max HW is the pipe diameter.
- 3: Actual HW is the greater of Inlet Control Square Edge and Outlet Control.

# **APPROVAL LETTER**

JUN 13 2006

|                                                                                               |                                     |                                                                                                   |                     |
|-----------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------|---------------------|
| <b>CITY OF LAS VEGAS</b>                                                                      |                                     | <b>DATE:</b>                                                                                      | <b>G.C. WALLACE</b> |
| <b>INTER-OFFICE MEMORANDUM</b>                                                                |                                     | June 9, 2006                                                                                      |                     |
| <b>TO:</b><br>Land Development Services<br>Department of Public Works                         |                                     | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |                     |
| <b>SUBJECT:</b> Technical Drainage Study for:<br><b>Franklin Park at Providence - Phase 3</b> |                                     | <b>COPIES TO:</b><br>G.C. Wallace, Inc.                                                           |                     |
| <b>Cross Streets:</b>                                                                         | NWC of Shaumber Road & Elkhorn Road | Toll Brothers, Inc.                                                                               |                     |
| <b>File Number:</b>                                                                           | F:\Depot\DSMEMOS\DS3744F.doc        | Bart Anderson, P.E., DevCo                                                                        |                     |
| <b>Parcel Number:</b>                                                                         | 126-13-410-001                      |                                                                                                   |                     |
| <b>Zoning Action:</b>                                                                         | TMP-5798                            |                                                                                                   |                     |
| <b>FEMA Flood Zone</b>                                                                        | YES                                 | NO                                                                                                | X                   |
| <b>Proposed Storm Drain</b>                                                                   | YES                                 | X                                                                                                 | NO                  |

| HISTORY                    | DATE RECEIVED        | DATE REVIEWED | COMMENTS             | REVIEW FEES       | FEES PAID Trn. No. |
|----------------------------|----------------------|---------------|----------------------|-------------------|--------------------|
| 1 <sup>st</sup> Submittal  | 2/16/2005            | 3/2/2005      | Not Approved         | \$400.00          | 16388: \$400       |
| 2 <sup>nd</sup> Submittal  | 4/11/2005            | 4/25/2005     | Not Approved         | \$400.00          | 19719: \$400       |
| 3 <sup>rd</sup> Submittal  | 5/9/2005 & 5/26/2005 | 5/27/2005     | Conditional Approval | \$400.00          | 21489: \$400       |
| Permission Letter Rec'd    | 6/16/2005            | 6/17/2005     | Approved             | N/C               | N/C                |
| 4 <sup>th</sup> Submittal  | 12/26/2005           | 1/23/2006     | Not Approved         | \$400.00          | 35795: \$400       |
| 5 <sup>th</sup> Submittal  | 5/26/2006            | 6/9/2006      | See Comments Below   | \$400.00          | 46358: \$400       |
| <b>TOTAL FEES (LDDRS):</b> |                      |               |                      | <b>\$2,000.00</b> | ---                |

**REMARKS:****4<sup>th</sup> & 5<sup>th</sup> Submittals: Update & Addendum for Phase 3**

The Drainage Study for the subject project has been reviewed and:

|   |                                                                                                |
|---|------------------------------------------------------------------------------------------------|
| X | is approved subject to conformance to all City standards and the following conditions:         |
|   | must be resubmitted or supplemented including the following:                                   |
|   | is conditionally approved subject to Clark County Regional Flood Control District concurrence. |
|   | is conditionally approved subject to the following conditions:                                 |

1. Label the existing 18" RCP in Puli Road with City of Las Vegas recorded plan number on Grading Plan III (Sheet 7).

The following comments are repeated until they are complete:

1. The Phase 3 study assumes Puli Road to be fully improved. No permit of any kind will be issued under Phase 3 prior to the full street improvement of Puli Road.
2. A Maintenance & Liability Agreement for an offsite berm behind Puli Road was required in the approval of Phases 1 & 2 and this agreement should have been executed and effective. This agreement will not be released until Puli Road is fully improved.



**NOTE:** Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

**NOTE:** Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

**END OF REMARKS**  
B&H/ays

T/R/S: T19S/R59E/13  
AREA F-13

**APPROVED  
GRADING PLANS  
CLOUDED**

# **GRADING PLANS**



**LETTER OF TRANSMITTAL**

**TO: City of Las Vegas**  
**Dept. of Public Works**  
**333 Rancho Drive**  
**Las Vegas, NV 89106**  
**ATTN: Mr. Robert Welsh, P.E.**

**DATE: February 6, 2011**  
**PROJECT: Franklin Park at Providence (POD 209)**  
**W.O. NO.: 7353**

**BY MAIL:** **BY XXX** **PICK-UP:** **EXPRESS MAIL:**  
**MESSENGER:**  
**FAX:** **FEDERAL EXPRESS:**

| <b>No. Copies:</b> | <b>Description</b>                                                               |
|--------------------|----------------------------------------------------------------------------------|
| 1                  | Update # 1 to Technical Drainage Study For Franklin Park at Providence (POD 209) |
| 1                  | Check # 09063018 for \$100.00                                                    |

**COMMENTS:**

**MATERIAL SENT FOR THE FOLLOWING REASONS:**

**CHECKING:** **FILING:** **APPROVAL: XXX** **YOUR FILES:**  
**OTHER:** **CC:**

**SENDER: Stanley Roberts, E.I.**

**ABOVE MATERIAL RECEIVED BY:**

**2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148**  
**TEL: (702)873-7550 FAX: 362-2597**  
**PUBLIC WORKS DEPARTMENT TEL: (702) 247-4020 FAX: (702) 247-4262**