DEL BOCA
VISTA
A LIMITED LIABILITY COMPANY

# EXHIBIT D

# Water Service Memo

DAVID EVANS
AND ASSOCIATES INC.

# MEMORANDUM

**DATE:** May 18, 2018

**TO:** Dan Danicic
Del Boca Vista – Riverland, LLC
500 E. Hancock Street
Newberg, OR 97132

**FROM:** Brady Berry, PE

**SUBJECT:** Riverrun Subdivision – Water Service

**PROJECT:** DBVC0000-0002
Riverrun Subdivision

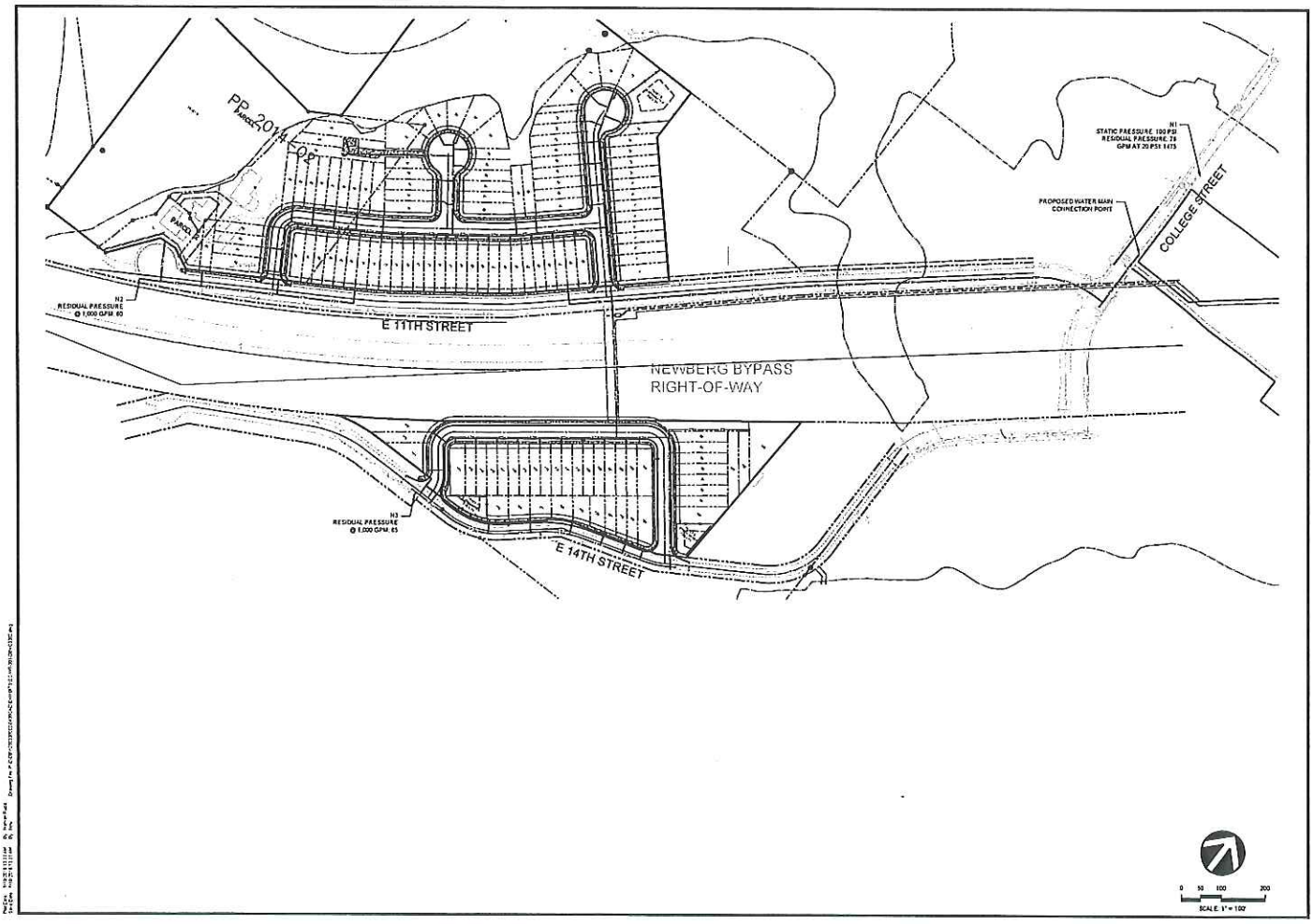
**CC:** File

The purpose of this memorandum is to document the preliminary design for water service to the Riverrun subdivision in Newberg Oregon. The proposed development design will meet the minimum pressure requirements of 40 PSI measured at each lot service meter and 20 PSI residual with a 1,000 GPM flow-rate for each proposed hydrant.

The preliminary design calculations are based on flow tests from the existing hydrant at 1210 S College Street near the project water main connection point. The residual pressures at proposed hydrants, which provided the greatest effective length from the proposed water main connection point, was determined for both Phase 1 and Phase 2 project areas. Preliminary calculations for the residual pressures at these locations are attached.

Attachments/Enclosures: EX020 Fire Service Exhibit; Water Service Flow Calculations; Existing Fire Hydrant Flow Test

File Path: P:\D\DBVC00000002\0600INFO\EC\02_Water System Design\Water Memo.docx




DAVID EVANS AND ASSOCIATES INC.
2100 SW River Parkway
Portland Oregon 97201
Phone: 503.223.6663

DESIGN STUDIO

PROJECT
RIVERRUN (A SUBDIVISION)
RIVERRUN SUBDIVISION LLC
NEWBERG, OREGON

SHEET TITLE
FIRE SERVICE EXHIBIT

| NO. | DATE | REVISION | BY |
|---|---|---|---|
| 1 | | | |

PRELIMINARY

DATE 04/13/18
DESIGN NJHU
DRAWN NJHU

SHEET NO
EX020

PROJECT NO. DEVC0000-0002

Water Service Flow Calculations
Riverrun Subdivision
Design By: NJRU Date: 5/17/18
Check By: BLBE

Equations:

**Equivalent Fitting Length (ft)** = Σ[Equivalent Fitting Length x Number of Fittings]

**Effective Length, L (ft)** = Pipe Length (ft )+ Equivalent Fitting Length (ft)

**Velocity, v (fps)** = Q (gpm) x 0.00223 (cfs/gpm) / Cross-Sectional Pipe Area (ft)

**Head Loss, h (ft)** = $10.44 \times L\text{ (ft)} \times Q\text{ (gpm)}^{1.85} / [C^{1.85} \times d\text{ (in)}^{4.8655}]$

**Final Residual Pressure, $P_f$ (psi)** = $[62.4 / 144] \times [[P_i\text{ (psi)} \times 144 / 62.4] - [v\text{ (fps)}^2 / [2 \times 32.2]] - h\text{ (ft)}]$

| From Node | To Node | Pipe Length (ft) | Eq. Fitting Length (ft) | Effective Length, L (ft) | Pipe Diameter, d (in) | Flow Rate, Q (gpm) | Velocity, v (fps) | Roughness Coefficient, C | Head Loss, h (ft) | Initial Static Pressure, $P_i$ (psi) | Final Residual Pressure, $P_f$ (psi) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N1 | N2 | 2930 | 111.4 | 3041.4 | 8 | 1000 | 6.39 | 100 | 90.74 | 100 | 60 |
| N1 | N3 | 2450 | 217.4 | 2667.4 | 8 | 1000 | 6.39 | 100 | 79.58 | 100 | 65 |

WYATT
FIRE PROTECTION, INC.
9095 S.W. Burnham
Tigard, OR 97223

## Fire Hydrant Fire Flow

| | |
|---|---|
| PROJECT | RIVER RUN PROJECT |
| ADDRESS | |
| CROSS STREET | |
| **FLOW** | |
| HYDRANT LOCATION | 1210 S. COLLEGE ST. |
| STATIC | 100 |
| PITOT RESIDUAL | 76 |
| GPM | 1475 |
| GPM AT 20 PSI | 3489, 1 – 2.5 PORT FLOWED *calculated per NFPA 291* |
| DATED | 02.06.18 12:50 pm |
| **MONITOR** | |
| HYDRANT LOCATION | 150' EAST OF FLOW HYDRANT |
| STATIC | 100 |
| RESIDUAL | 76 |
| DATED | 02.06.18 12:50 PM |
| **WITNESS** | |
| WITNESSED BY | |
| TITLE | |
| ORGANIZATION | NEWBERG PUBLIC WORKS |
| SIGNATURE | |
| PERFORMED BY | JACK GARDNER |