

PRE-DEVELOPMENT

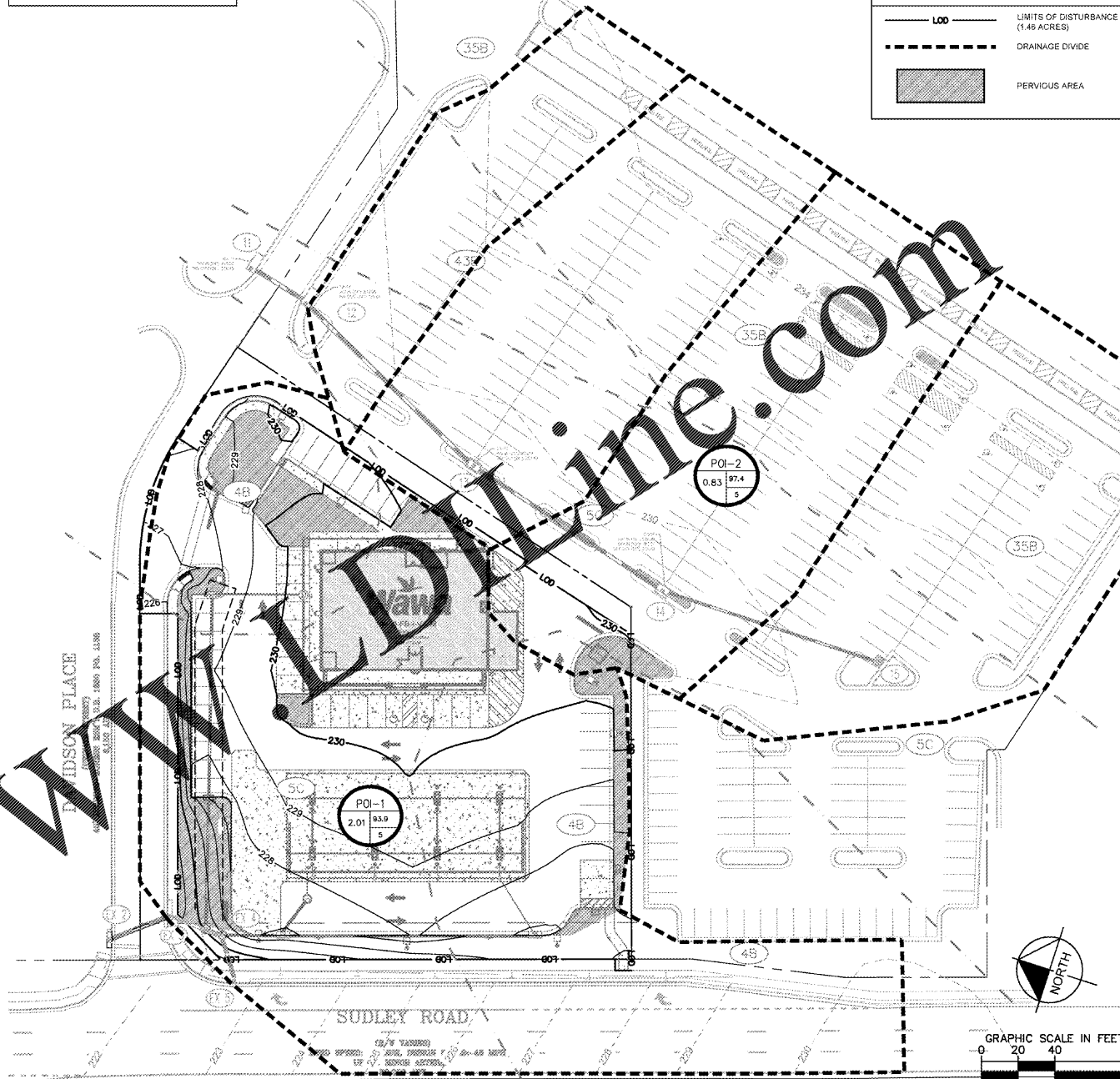
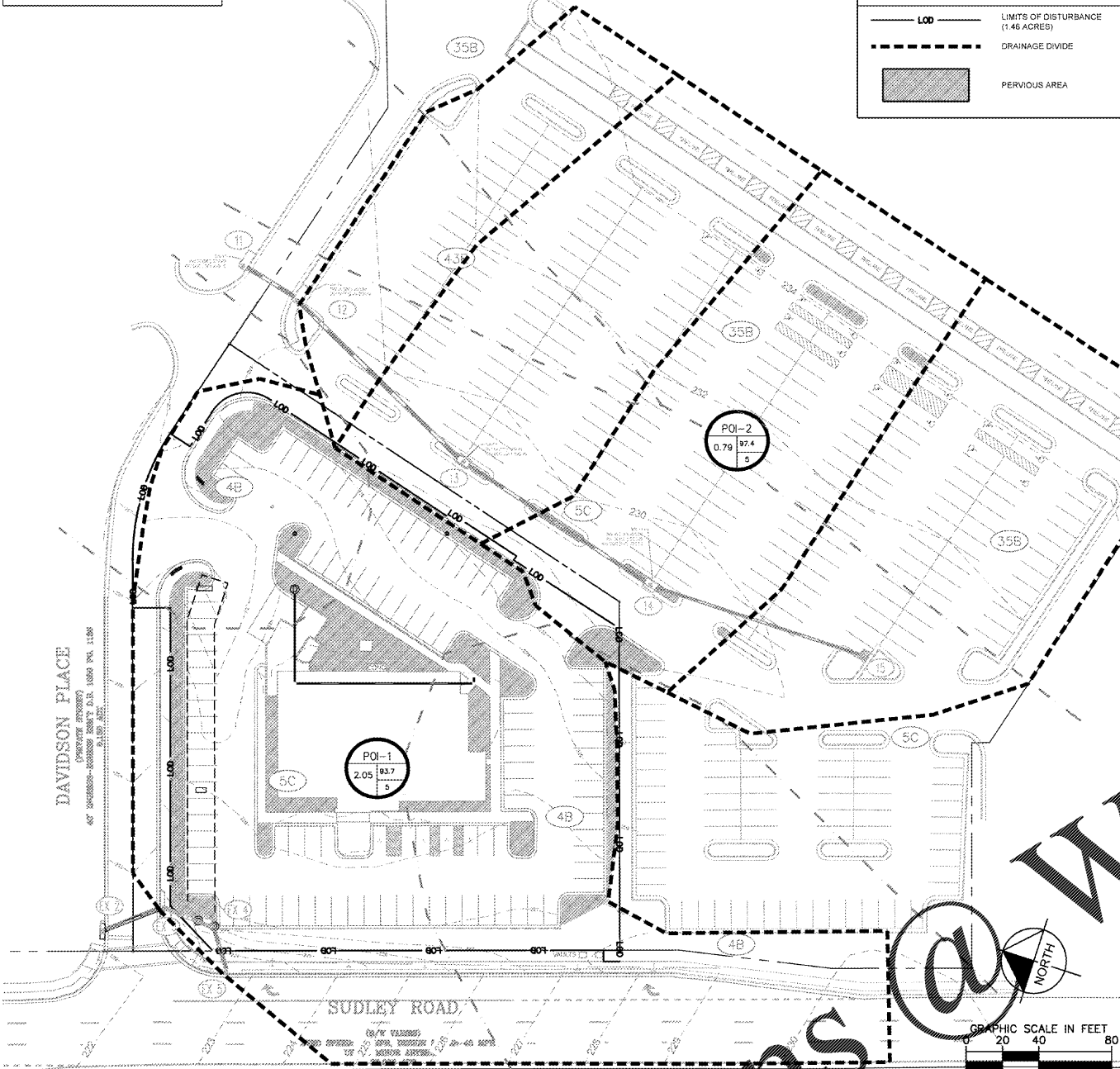
POST-DEVELOPMENT

LEGEND

- L.O.D. — LIMITS OF DISTURBANCE (1.46 ACRES)
- - - DRAINAGE DIVIDE
- ▨ PERVIOUS AREA

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- L.O.D. — LIMITS OF DISTURBANCE (1.46 ACRES)
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Drainage Area Calculations for SCS Method

Project: Wawa - Sudley Road Date: 09/07/19 Initial: [redacted]

| Drainage Area | Total Area (sf) | Curve Numbers | | | | | | | | Total Area | Curve Number | | |
|---------------|-----------------|---------------|-------------|-------------------|-------------|---------------|-------------|-------------------|-------------|---------------|--------------|-------------|-------------|
| | | Impervious | | Open Space (good) | | Impervious | | Open Space (good) | | | | | |
| | | HSG | B | HSG | D | HSG | D | HSG | D | | | | |
| POI-1 | 89,195 | 18,230 | 0.42 | 10,210 | 0.23 | 36,705 | 0.84 | 6,330 | 0.15 | 34,100 | 0.78 | 2.05 | 93.7 |
| POI-2 | 34,300 | 18,230 | 0.42 | 10,210 | 0.23 | 36,705 | 0.84 | 6,330 | 0.15 | 34,100 | 0.78 | 0.79 | 97.4 |
| Total | 123,495 | 18,230 | 0.42 | 10,210 | 0.23 | 36,705 | 0.84 | 6,330 | 0.15 | 34,100 | 0.78 | 2.84 | 94.7 |

| Hyd. No. | Hydrograph type (right) | Inflow hydro | Peak Outflow (cfs) | | | | | | | | Hydrograph Description |
|----------|-------------------------|--------------|--------------------|-------|------|-------|-------|-------|--------|-----------|------------------------|
| | | | 1-yr | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | | |
| 1 | SCS Runoff | --- | 6,198 | 7,870 | --- | 12.42 | --- | --- | --- | PRE-POI1 | |
| 2 | SCS Runoff | --- | 2,827 | 3,210 | --- | 4.99 | --- | --- | --- | PRE-POI2 | |
| 3 | SCS Runoff | --- | 5,932 | 7,962 | --- | 12.21 | --- | --- | --- | POST-POI1 | |
| 4 | SCS Runoff | --- | 2,754 | 3,387 | --- | 5.24 | --- | --- | --- | POST-POI2 | |

FLOOD PROTECTION NARRATIVE POI-1

IN ORDER TO MEET VIRGINIA DEQ FLOOD PROTECTION REQUIREMENTS, THIS PROJECT PROPOSES TO MEET SECTION 9VAC25-870-66 C.1, WHICH STATES:

CONCENTRATED STORMWATER FLOW TO STORMWATER CONVEYANCE SYSTEMS THAT CURRENTLY DO NOT EXPERIENCE LOCALIZED FLOODING DURING THE 10-YEAR 24-HOUR STORM EVENT. THE POINT OF DISCHARGE RELEASES STORMWATER INTO A STORMWATER CONVEYANCE SYSTEM THAT, FOLLOWING THE LAND-DISTURBING ACTIVITY, CONFINES THE POSTDEVELOPMENT PEAK FLOW RATE FROM THE 10-YEAR 24-HOUR STORM EVENT WITHIN THE STORMWATER CONVEYANCE SYSTEM. DETENTION OF STORMWATER OR DOWNSTREAM IMPROVEMENTS MAY BE INCORPORATED INTO THE APPROVED LAND-DISTURBING ACTIVITY TO MEET THIS CRITERION, AT THE DISCRETION OF THE VSMP AUTHORITY.

BELOW ARE THE PRE AND POST DEVELOPMENT PEAK FLOWS, CALCULATED USING THE TR-55 METHOD WITHIN HYDRAFLOW HYDROGRAPHS EXTENSION FOR AUTODESK 2018.

10-Year Peak Runoff Rates (cfs)

| | POI-1 | POI-2 |
|------------------|-------|-------|
| Pre-Development | 12.42 | 4.99 |
| Post-Development | 12.21 | 5.24 |

IN THE EXISTING CONDITION, INLET EX-3 COLLECTS STORMWATER FROM THE SUBJECT PARCEL AND THE NORTHBOUND LANES OF SUDLEY ROAD. IT DOES NOT EXPERIENCE LOCALIZED FLOODING CURRENTLY. TO DEMONSTRATE COMPLIANCE WITH SECTION 9VAC25-870-66 C.1, THE PROPOSED PEAK DISCHARGE WAS COMPARED TO THE CAPACITY OF THE PIPE IMMEDIATELY DOWNSTREAM OF INLET EX-3. AS SHOWN BELOW, THE DOWNSTREAM PIPE HAS A CAPACITY OF 16.87 CFS, WHICH IS GREATER THAN THE PROPOSED DISCHARGE OF 12.21 CFS. SINCE THE PROPOSED DISCHARGE IS LESS THAN THE CAPACITY OF THE EXISTING PIPE, THIS POINT OF INTEREST IS IN COMPLIANCE WITH VA DEQ FLOOD PROTECTION REQUIREMENTS.

| From Point | To Point | Invert Elev Up | Invert Elev Down | Length ft | Slope % | Pipe Dia in | Capacity cfs |
|------------|----------|----------------|------------------|-----------|---------|-------------|--------------|
| EX-3 | EX-2 | 217.54 | 216.64 | 35 | 2.58 | 18 | 16.87 |

FLOOD PROTECTION NARRATIVE POI-2

IN ORDER TO MEET VIRGINIA DEQ FLOOD PROTECTION REQUIREMENTS, THIS PROJECT PROPOSES TO MEET SECTION 9VAC25-870-66 C.1, WHICH STATES:

CONCENTRATED STORMWATER FLOW TO STORMWATER CONVEYANCE SYSTEMS THAT CURRENTLY DO NOT EXPERIENCE LOCALIZED FLOODING DURING THE 10-YEAR 24-HOUR STORM EVENT. THE POINT OF DISCHARGE RELEASES STORMWATER INTO A STORMWATER CONVEYANCE SYSTEM THAT, FOLLOWING THE LAND-DISTURBING ACTIVITY, CONFINES THE POSTDEVELOPMENT PEAK FLOW RATE FROM THE 10-YEAR 24-HOUR STORM EVENT WITHIN THE STORMWATER CONVEYANCE SYSTEM. DETENTION OF STORMWATER OR DOWNSTREAM IMPROVEMENTS MAY BE INCORPORATED INTO THE APPROVED LAND-DISTURBING ACTIVITY TO MEET THIS CRITERION, AT THE DISCRETION OF THE VSMP AUTHORITY.

BELOW ARE THE PRE AND POST DEVELOPMENT PEAK FLOWS, CALCULATED USING THE TR-55 METHOD WITHIN HYDRAFLOW HYDROGRAPHS EXTENSION FOR AUTODESK 2018.

10-Year Peak Runoff Rates (cfs)

| | POI-1 | POI-2 |
|------------------|-------|-------|
| Pre-Development | 12.42 | 4.99 |
| Post-Development | 12.21 | 5.24 |

IN THE EXISTING CONDITION, INLET 14 (WHICH COLLECTS STORMWATER FROM POI-2) DOES NOT EXPERIENCE LOCALIZED FLOODING. AS SHOWN ABOVE, THE PIPE IMMEDIATELY DOWNSTREAM OF INLET 14 WILL CONVEY 5.24 CFS IN THE PROPOSED CONDITION, AN INCREASE OF 0.25 CFS FROM THE EXISTING TO DEMONSTRATE COMPLIANCE WITH SECTION 9VAC25-870-66 C.1. THIS INCREASE WAS APPLIED TO ALL DOWNSTREAM PIPES, MIMICKING THE IMPACT THE INCREASE DISCHARGE WILL HAVE ON THE SYSTEM, AS SHOWN IN THE TABLE BELOW. THE REVISED DISCHARGES ARE LESS THAN THE CAPACITIES OF THE PIPES, WHICH PROVES THAT THIS POINT OF INTEREST IS IN COMPLIANCE WITH VA DEQ FLOOD PROTECTION REQUIREMENTS.

| STORM SEWER DESIGN COMPUTATIONS | | | | | | | | | | | | Runoff Q (cfs) |
|---------------------------------|--------|--------|-------|----------|----------|--------|---------|----------|------|------|------|----------------|
| Station | Invert | Length | Slope | Pipe Dia | Capacity | Inflow | Outflow | Velocity | Time | Time | Time | |
| 1+00 | 217.54 | 35 | 2.58 | 18 | 16.87 | 12.21 | 12.21 | 1.5 | 0.00 | 0.00 | 0.00 | 12.21 |
| 1+35 | 216.64 | 0 | 0.00 | 18 | 16.87 | 5.24 | 5.24 | 1.5 | 0.00 | 0.00 | 0.00 | 5.24 |

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ROSS STEVENS
 Lic. No. 047498
 02/06/2019
 PROFESSIONAL ENGINEER

KHA PROJECT: 110499001
 DATE: 02/06/2019
 SCALE: AS SHOWN
 DESIGNED BY: CAH
 DRAWN BY: CAH
 CHECKED BY: RSS

FLOOD PROTECTION CALCULATIONS

WAWA - SUDLEY ROAD
 PREPARED FOR FRONTIER DEVELOPMENT
 PRINCE WILLIAM COUNTY, VA

1 P.W.C. COMMENTS - 1ST ROUND 09/10/2018/CAH
 2 P.W.C. COMMENTS - 2ND ROUND 11/02/2018/CAH
 3 P.W.C. COMMENTS - SIGNATURE SET 02/06/2019/CAH
 4 UTILITY REVISIONS 07/25/2019/CAH

SHEET NUMBER **C-421**