ALLISON RAMSEY
Architects Inc. creating sustainable timeless design

January 4, 2010

Dan Ahern
Beaufort County Engineering Division
102 Industrial Village Rd, Bldg. 3
Beaufort, SC 29906

**RE:** Storm water Worksheet for Single Family Homes

Dan,

Thank you for the opportunity to work with you on this project. We've included this summary of our work as a conclusion to our analysis of the proposed storm water controls for single family home sites. The purpose of our analysis was to study the spectrum of lot types that occur throughout the county and identify and develop real cost associated with the design solutions that were determined using the proposed worksheet.

**CASE STUDIES:** After studying the worksheet we decided to use projects that have recently been built in the county. Using these projects as case studies allowed us to have a real world comparison to the impacts with and without the new ordinance. We developed site plans and design solutions for seven (7) sites that range from a small urban lot in the City of Beaufort to a large rural lot in Beaufort County. We feel that the diversity in project types and lot sizes provides a very wide range of solutions that are based in reality, not theory. Additionally sites within the Town of Port Royal and multi-family sites were included in this study. These sites help to recognize the trends occurring with urban infill in the Town of Port Royal and the City of Beaufort.

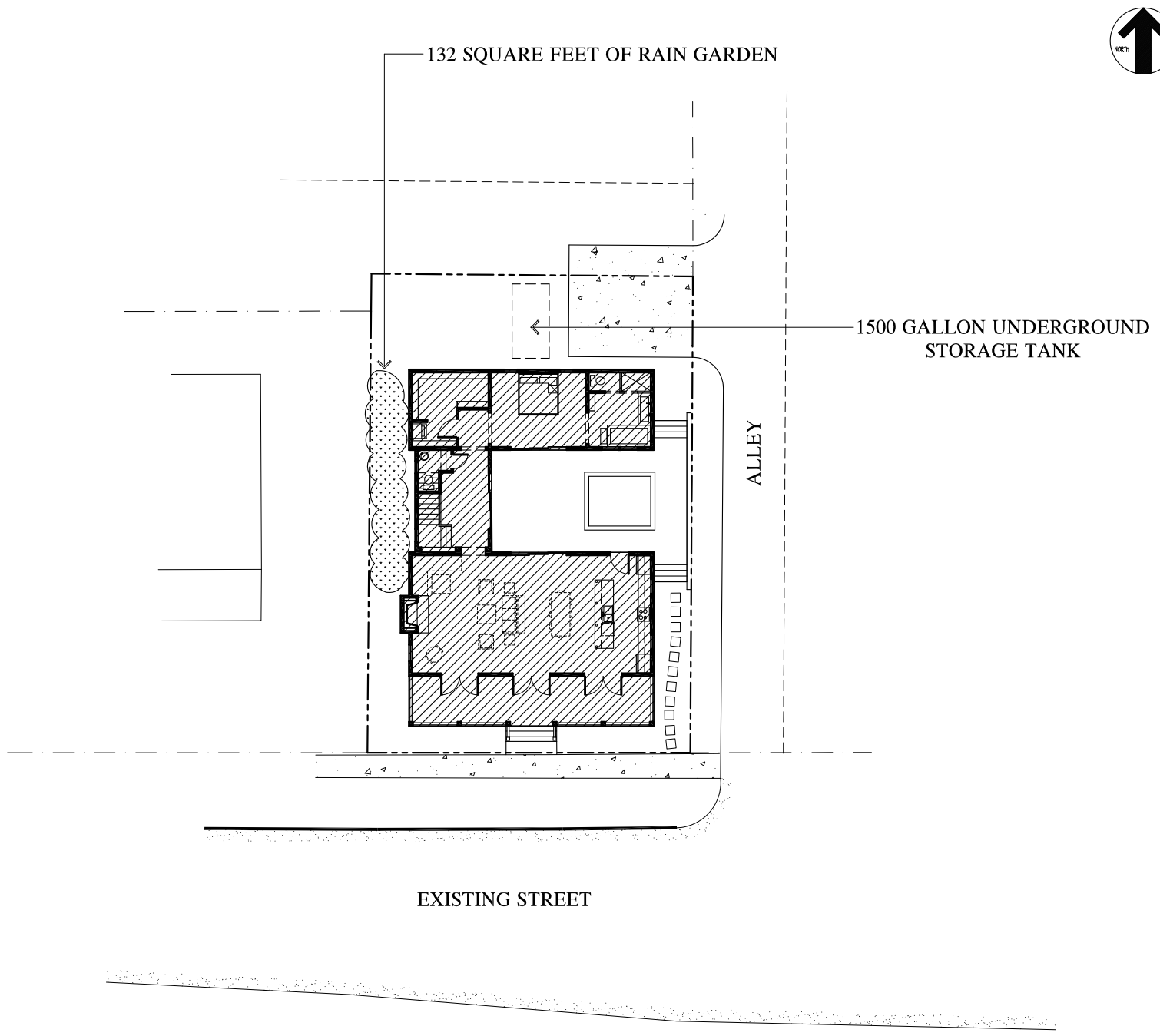
**DESIGN SOLUTIONS**: In all cases, the design solutions were achieved on the existing site plans without needing to compromise the proposed concept. This is a critical component in order for this ordinance to be successfully implemented without drastically changing how we plan and develop single family currently. The ability to implement and even retro-fit existing designs without compromising the design solution is crucial for overall acceptance. We feel that the proposed controls are reasonably achieved in all the cases we analyzed.

**COST ANALYSIS:** The cost analysis for the design solutions varied from an additional cost of $4000 to $14,800 per site. However there are many variables and disclaimers that need to be associated with each of these costs. Costs were determined by using actual prices from local sub contractors in combination with industry standards and national pricing models. Most design options were studied to achieve the most cost effective solution but in some cases additional cost savings could be achieved. We feel that the best way to understand these additional costs are to base them on a square foot price. Our case studies show that the average cost for implementing the design solution was $1.40 per square foot.

**SUMMARY:** Upon commencement of this project, it was a concern that this ordinance would provide disincentives to infill and growth in the more urban areas of our county and encourage users to go to areas where more land is available. Our cost analysis did not support this initial concern. In fact, the more urban areas proved to be more cost effective in our case studies. We feel that the overall worksheet is user friendly and can be understood and implemented by the end user, not just a design professional. A key component in this ordinance will be the ability to allow flexibility in how it is initially enforced during its pilot period. Our case studies were performed using a limited amount of solutions to demonstrate its implementation. However, as new techniques and materials are developed it will be imperative that this ordinance allow the user some flexibility to implement these techniques without a costly delay. Providing staff with the flexibility to allow exceptions will be necessary. Additionally, this will certainly add to the cost of a single family home by a substantial amount, we feel that the cost are reasonable for the overall impact of the solutions to our natural environment, however, we would also like to encourage staff to develop cost incentives that could be used to offset these additional cost that are being passed along to the individual.

Respectfully submitted,

Cooter Ramsey
Allison Ramsey Architects, Inc.




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA = 2,762 S.F.<br>Home (rooftop) = 1,831 S.F.<br>Other Impervious (drives/walks,etc.) = 931 S.F. | STORAGE FOR REUSE = 1,500 Gallons<br>(1) 1500 Gallon Cistern System | $3,500 |
| AREA OF LOT = 4,004 S.F. | DISCONNECTED DRAINAGE = 694 Gallons | n/a |
| IRRIGATION = FULL LOT | RAINGARDEN = 1061 Gallons | $500 |
| TOTAL RUNOFF = 3,255 GALLONS | TOTAL CONTROLLED = 3,255 Gallons | TOTAL COST = $4,000 |

TOTAL RUNOFF = 3,255 GA. TOTAL CONTROLLED = 3,255 GA.

TOTAL COST = $4,000

Notes: Storm water controls for this lot could be reduced if owner used a pervious material for parking.
Cost per square foot heated = $1.12

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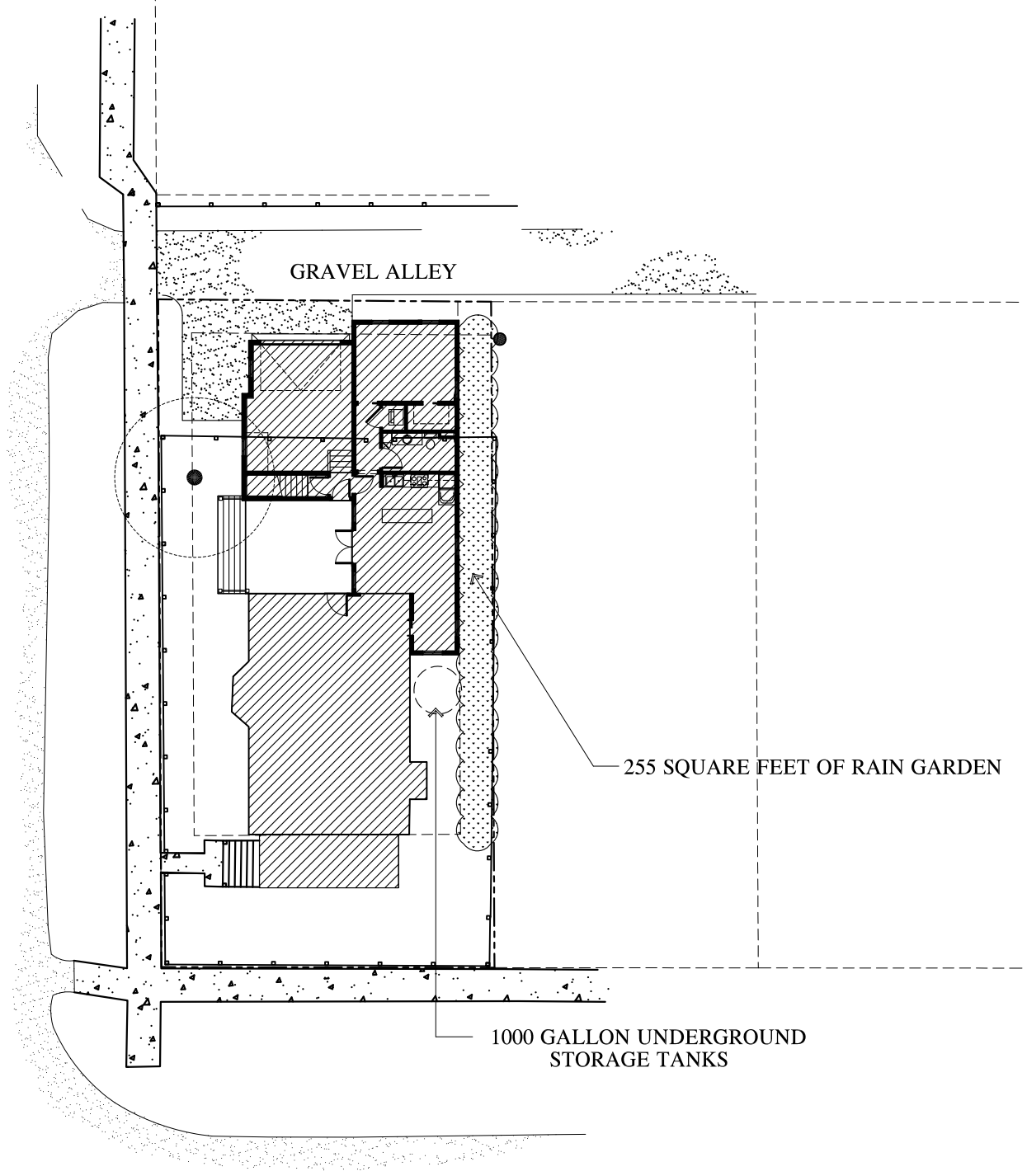
URBAN LOT

CITY OF BEAUFORT




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA = 2,546 S.F.<br>Home (rooftop) = 2,186 S.F.<br>Other Impervious (drives/walks,etc.) = 360 S.F. | STORAGE FOR REUSE = 1,000 Gallon<br>1000 Gallon Cistern System | $4,000 |
| AREA OF LOT = 5,009 S.F. | DISCONNECTED DRAINAGE = 374 Gallons | n/a |
| IRRIGATION = FULL LOT | RAINGARDEN = 1,554 Gallons | $525 |
| TOTAL RUNOFF = 2,928 GALLONS | TOTAL CONTROLLED = 2,928 Gallons | TOTAL COST = $4,525 |

TOTAL RUNOFF = 2,928 GA. TOTAL CONTROLLED = 2,928 GA.

TOTAL COST = $4,525

Cost per square foot heated = $1.14

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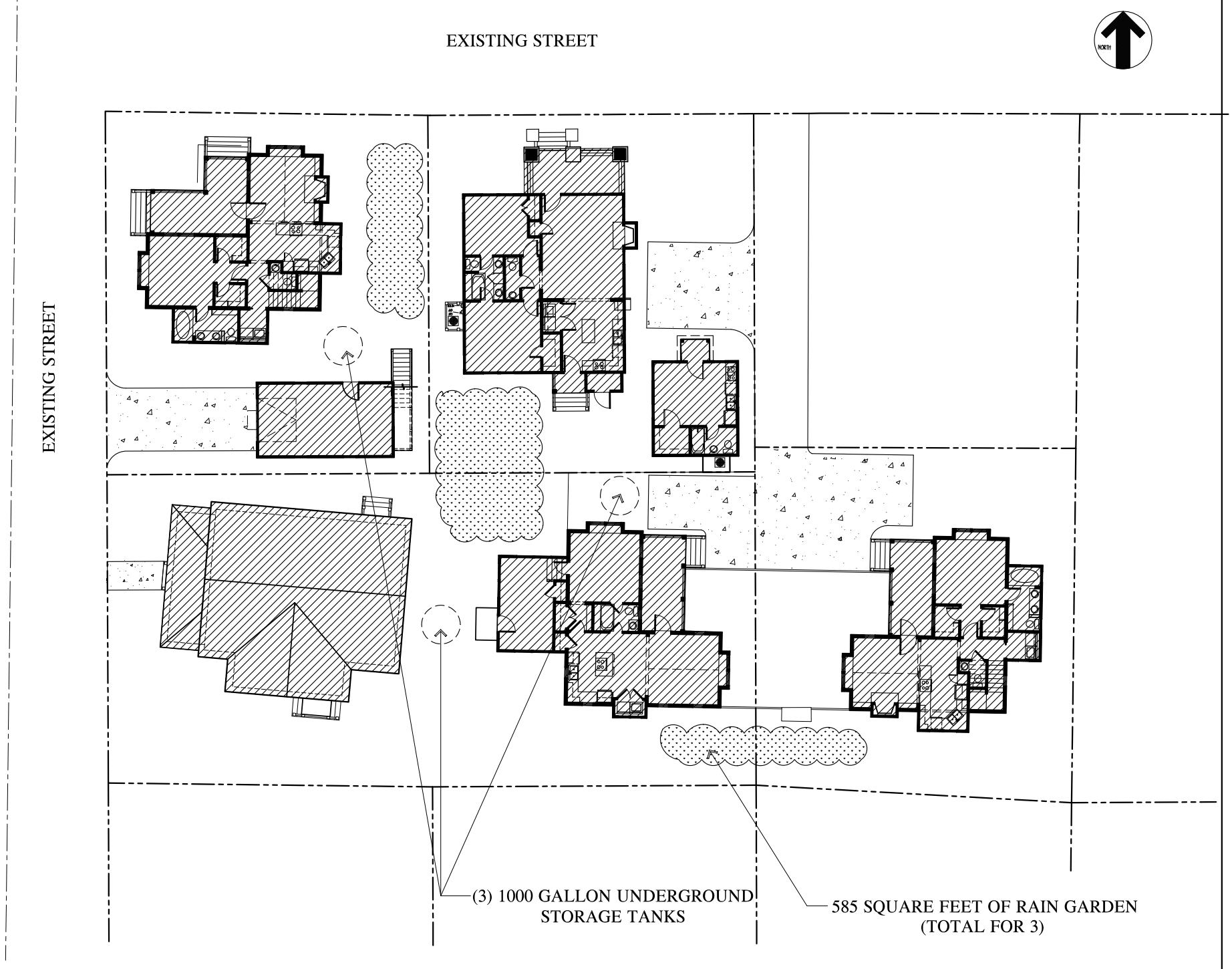
URBAN LOT

TOWN OF PORT ROYAL




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA =8009 S.F.<br>Home (rooftop) = 6,349 S.F.<br>Other Impervious (drives/walks,etc.) = 1660 S.F. | STORAGE FOR REUSE = 3,000 Gallons<br>(3) 1000 Gallon Cistern System | $10,100 |
| AREA OF LOT = 10,735 S.F. | DISCONNECTED DRAINAGE = 1494 Gallons | n/a |
| IRRIGATION = FULL LOT | RAINGARDEN = 4716 Gallons | $1,200 |
| TOTAL RUNOFF = 9,210 GALLONS | TOTAL CONTROLLED = 9,210 Gallons | TOTAL COST = $11,300 |

TOTAL RUNOFF = 9,210 GA. TOTAL CONTROLLED = 9,210 GA.

TOTAL COST = $11,300

Notes: Storm water controls for this lot could be reduced if owner used a pervious material for parking and drives.
Cost per square foot heated = $1.58

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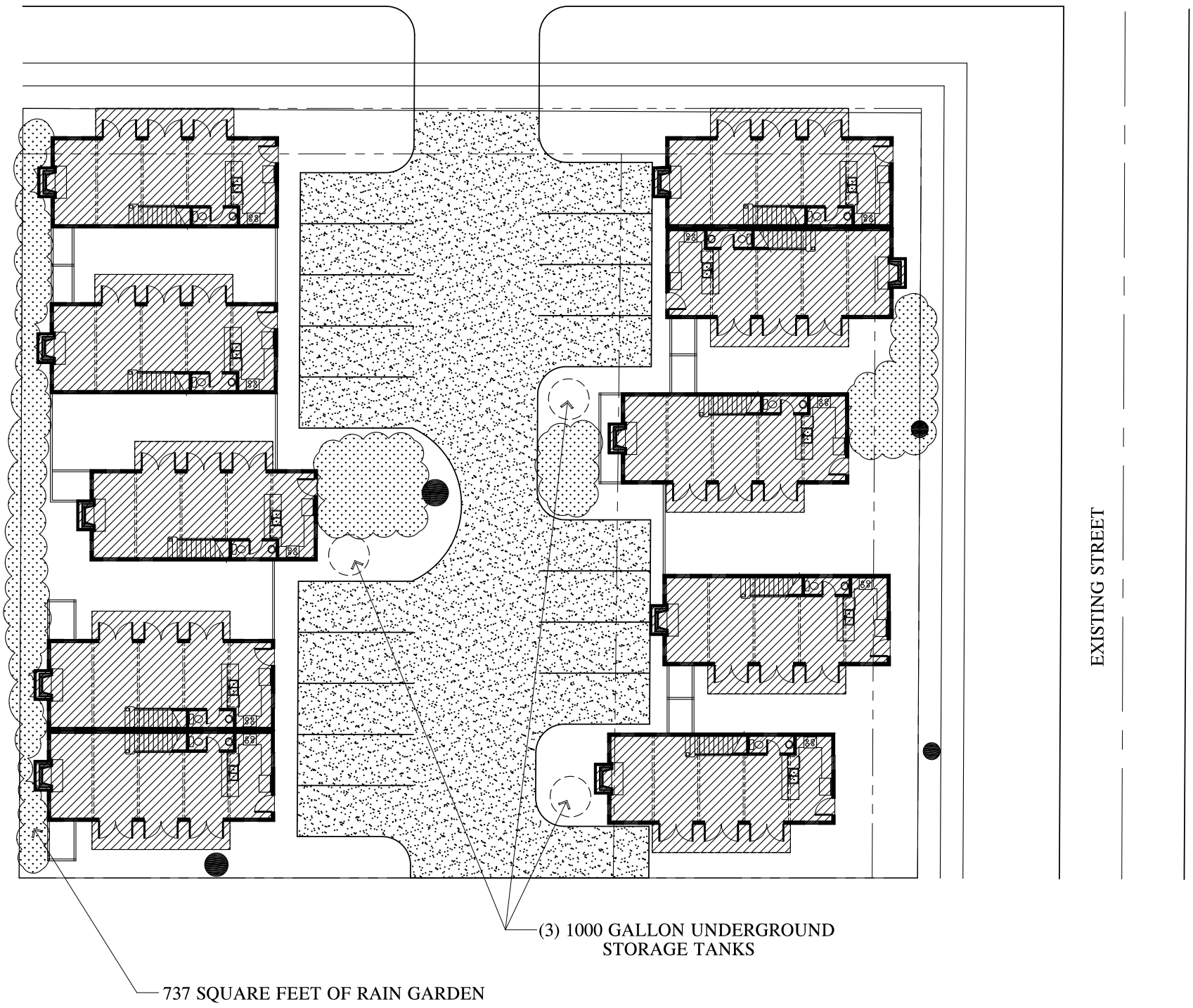
URBAN INFILL

CITY OF BEAUFORT




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA =8,540 S.F.<br>Home (rooftop) = 7,740 S.F.<br>Other Impervious (drives/walks,etc.) = 800 S.F. | STORAGE FOR REUSE = 3,000 Gallons<br>(3) 1000 Gallon Cistern System | $13,300 |
| AREA OF LOT = 21,406 S.F. | DISCONNECTED DRAINAGE = 888 Gallons | n/a |
| IRRIGATION = FULL LOT | RAINGARDEN = 5,933 Gallons | $1,500 |
| TOTAL RUNOFF = 9,821 GALLONS | TOTAL CONTROLLED = 9,821 Gallons | TOTAL COST = $14,800 |

TOTAL RUNOFF = 9,821 GA. TOTAL CONTROLLED = 9,821 GA.

TOTAL COST = $14,800

Cost per square foot heated = $1.23

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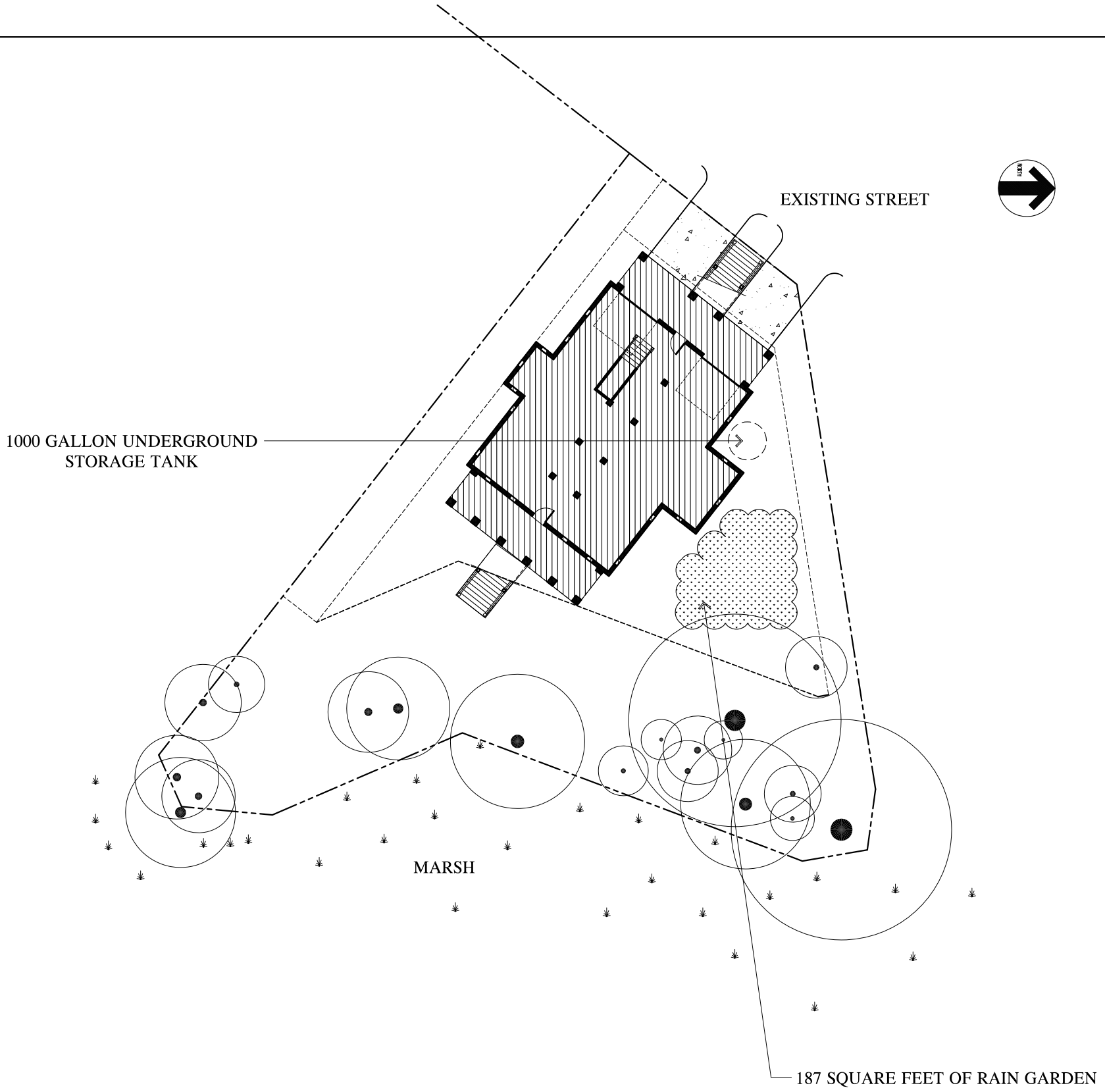
URBAN INFILL

TOWN OF PORT ROYAL




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA =2,655 S.F.<br>Home (rooftop) = 2,155 S.F.<br>Other Impervious (drives/walks,etc.) = 500 S.F. | STORAGE FOR REUSE = 1,000 Gallon<br>1000 Gallon Cistern System | $3,000 |
| AREA OF LOT = 9,888 S.F. | DISCONNECTED DRAINAGE = 550 Gallons | n/a |
| IRRIGATION = PARTIAL LOT | RAINGARDEN = 1,503 Gallons | $500 |
| TOTAL RUNOFF = 3,053 GALLONS | TOTAL CONTROLLED = 3,053 Gallons | TOTAL COST = $3,500 |

TOTAL RUNOFF = 3,053 GA. TOTAL CONTROLLED = 3,053 GA.

TOTAL COST = $3,500

Notes: Storm water controls for this lot could be reduced if owner used a pervious material for parking and drives.
Cost per square foot heated = $1.45

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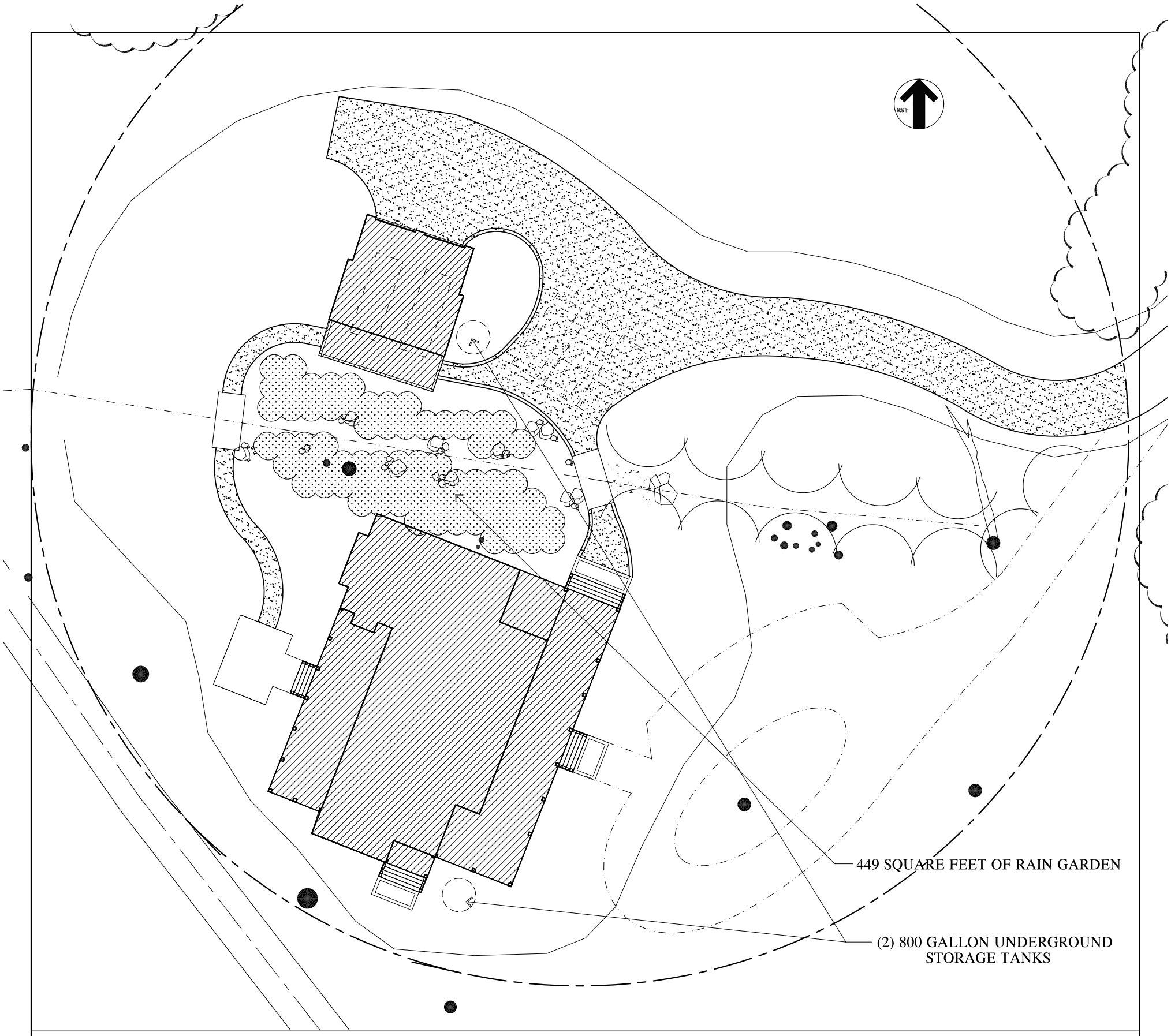
# COASTAL LOT

# TYPICAL T-3 RES.




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA =4,642 S.F.<br>Home (rooftop) = 4,542 S.F.<br>Other Impervious (drives/walks,etc.) = 100 S.F. | STORAGE FOR REUSE = 1600 Gallons<br>(2) 800 Gallon Cistern System | $6,000 |
| AREA OF LOT = 43,558 S.F. | DISCONNECTED DRAINAGE = 120 Gallons | n/a |
| IRRIGATION = PARTIAL LOT | RAINGARDEN = 3,618 Gallons | $950 |
| TOTAL RUNOFF = 5,338 GALLONS | TOTAL CONTROLLED = 5,338 Gallons | TOTAL COST = $6,950 |

TOTAL RUNOFF = 5,338 GA. TOTAL CONTROLLED = 5,338 GA.

TOTAL COST = $6,950

Cost per square foot heated = $1.54

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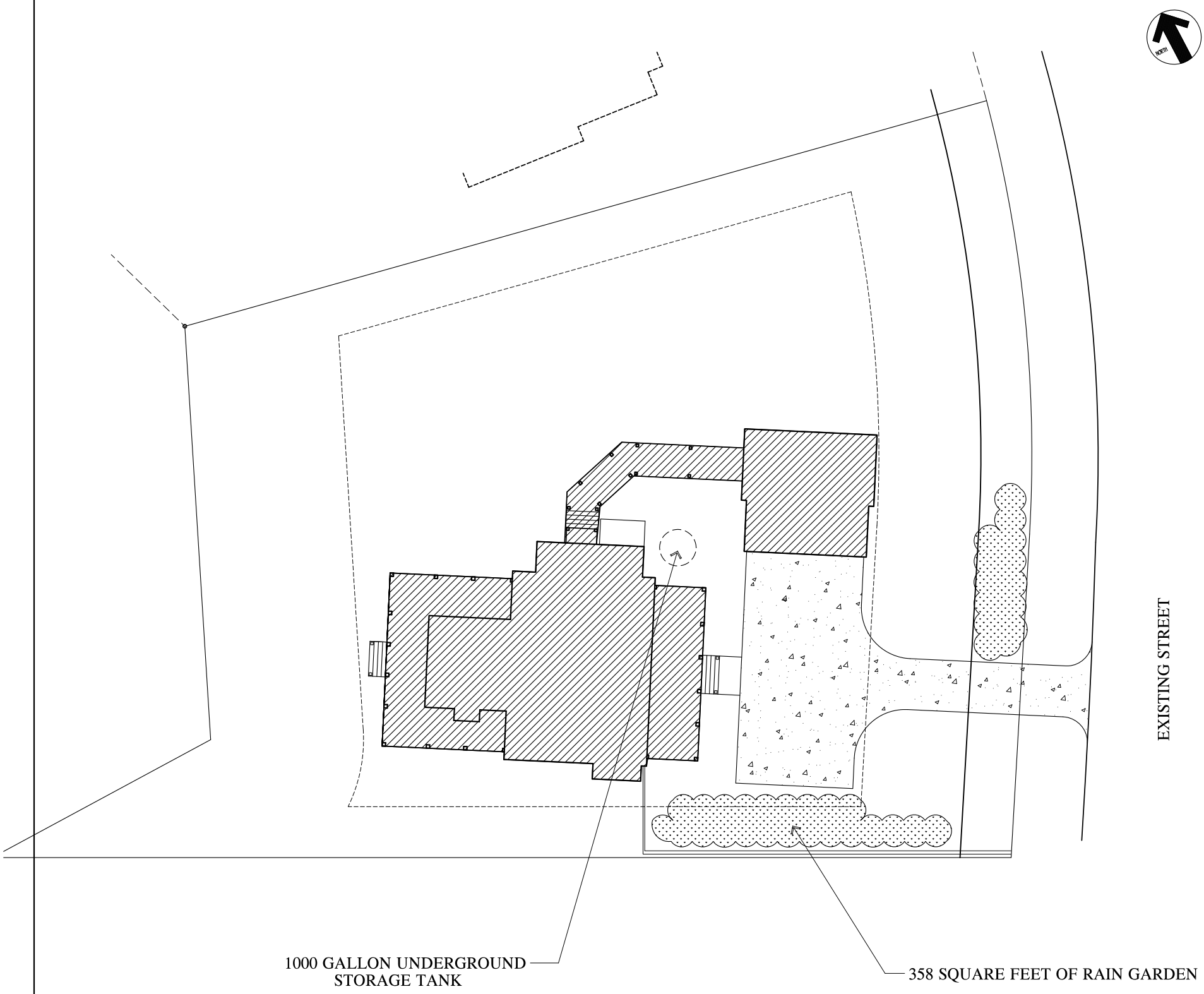
RURAL LOT

TYPICAL T-2 RES.




| VOLUME REQUIREMENTS | PROPOSED CONTROLS | COST |
|---|---|---|
| IMPERVIOUS BY AREA =4,880 S.F.<br>Home (rooftop) = 3,230 S.F.<br>Other Impervious (drives/walks,etc.) = 1,650 S.F. | STORAGE FOR REUSE = 1,000 Gallon<br>1000 Gallon Cistern System | $4,500 |
| AREA OF LOT =21,020 S.F. | DISCONNECTED DRAINAGE = 1,732 Gallons | n/a |
| IRRIGATION = PARTIAL LOT | RAINGARDEN = 2,880 Gallons | $800 |
| TOTAL RUNOFF = 5,612 GALLONS | TOTAL CONTROLLED = 5,612 Gallons | TOTAL COST = $5,300 |

TOTAL RUNOFF = 5,612 GA. TOTAL CONTROLLED = 5,612 GA.

TOTAL COST = $5,300

Notes: Storm water controls for this lot could be reduced if owner used a pervious material for parking and drives.
Cost per square foot heated = $1.77

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# SUBURBAN LOT

# TYPICAL T-3 RES.