

TOWN OF MOUNT HOLLY

Star Lake Dam

November 21, 2013

Presentation by
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DuBois
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inc.



Existing Conditions

Engineering Evaluation

- Site Inspection
- Topographic Survey
- Hydrology & Hydraulics
- Geotechnical Investigation
- File/Data Review

Common Dam Deficiencies

- Deteriorating concrete: spalling, delamination, cracking, typical wear
- Eroded embankment: overtopping, uncontrolled discharge, head cutting in the downstream channel
- Inadequate spillway hydraulic capacity: at historic water level (1846.65 +/-) overtopping occurs during a 4.40-inch rainstorm, <25-year return interval



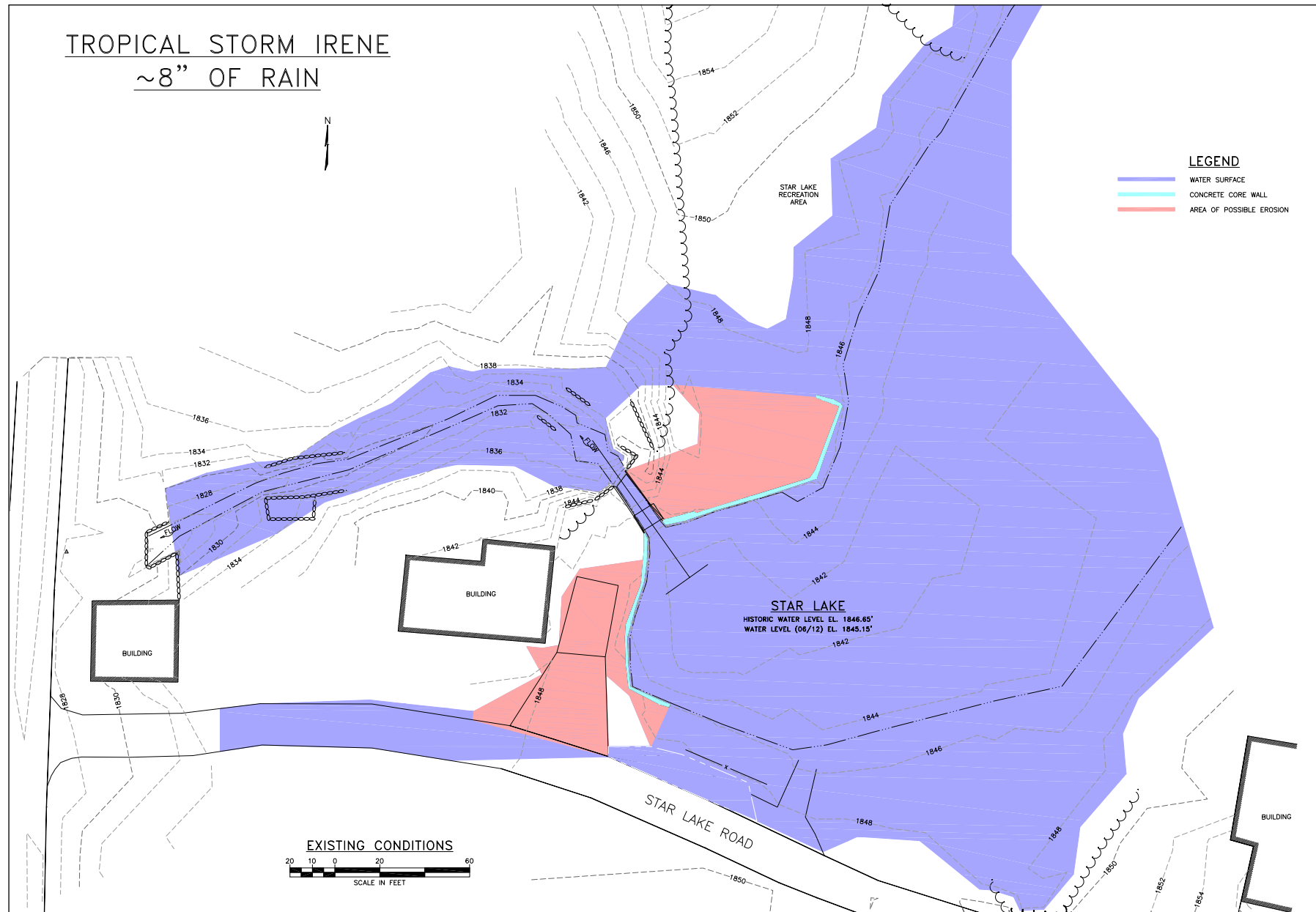
Existing Conditions

Tropical Storm Irene

- 6" average regional rainfall (NWS stations)
- 8" recorded in the Star Lake watershed
- Estimated peak water level was 1848.25 during Irene, with starting water surface at 1845.15
- If at historic water level, the estimated peak water level during Irene would have been 1848.82
- Prolonged overtopping = more damage



Tropical Storm Irene



Evaluated Alternatives

Conform to Regulatory Requirements

- Provide hydraulic capacity for the 1/2 Probable Maximum Flood (14.5 inches of rain in 24 hours)
- Protect embankment from overtopping during all flood events
- Rehabilitate existing concrete
- Regrade embankment and outlet channel to prevent erosion



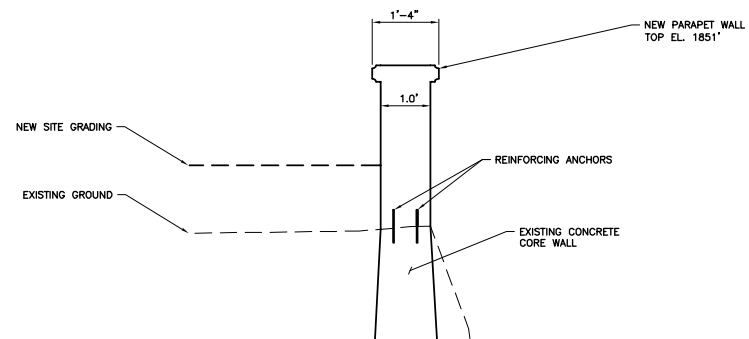
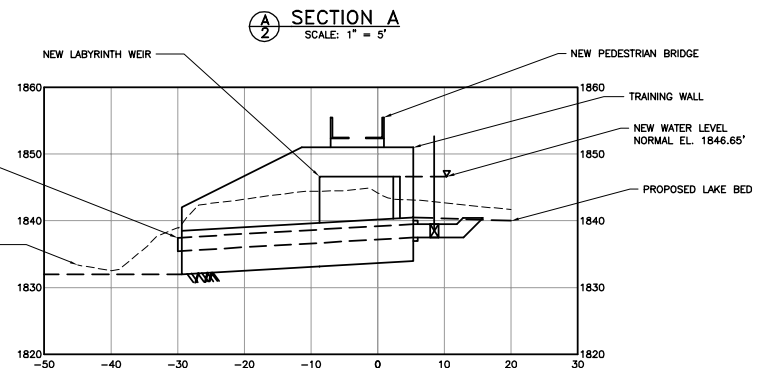
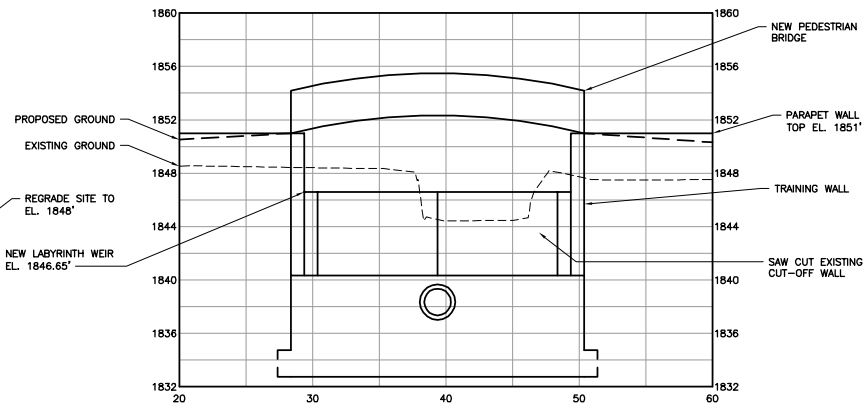
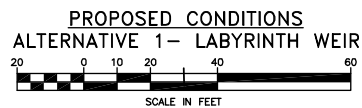
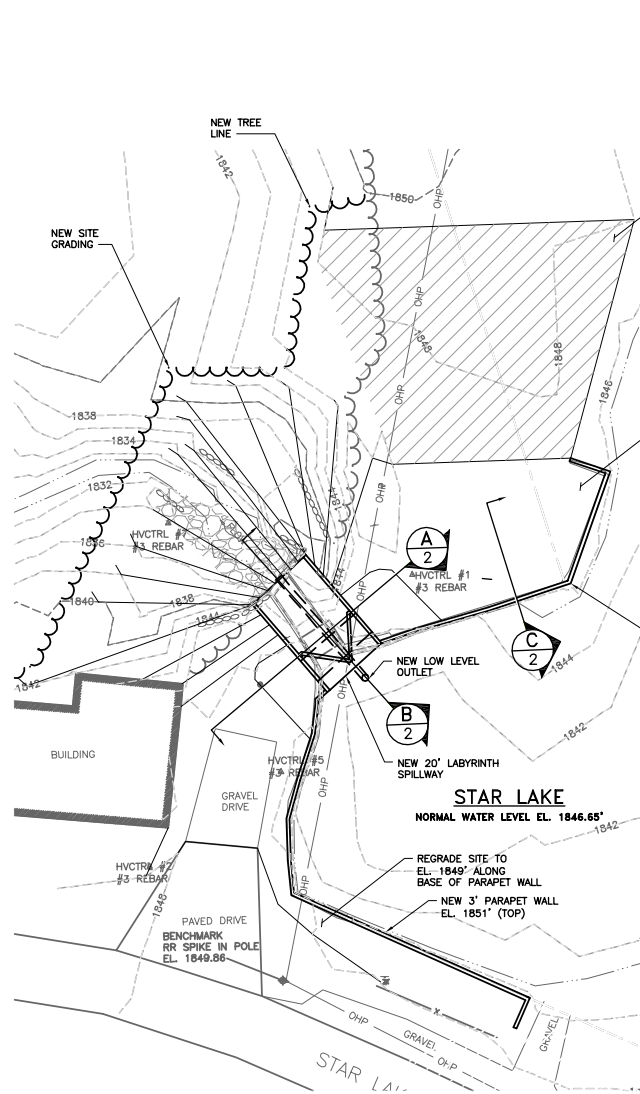
Alternative 1 - Overflow Spillway with Labyrinth Weir

Address Deficiencies

- New concrete training walls
- Articulated concrete blocks on right at beach area
- Concrete overflow section consisting of a 1-cycle labyrinth weir spanning 25 (weir length of 38 feet)
- Rising stem sluice gate
- Parapet wall along the existing cut-off wall
- Extend the left cut-off wall to the boat launch



Alternative 1 - Overflow Spillway with Labyrinth Weir



Auxiliary Spillway with ACBs



Parapet Wall



Alternative 1 - Summary

Address Deficiencies

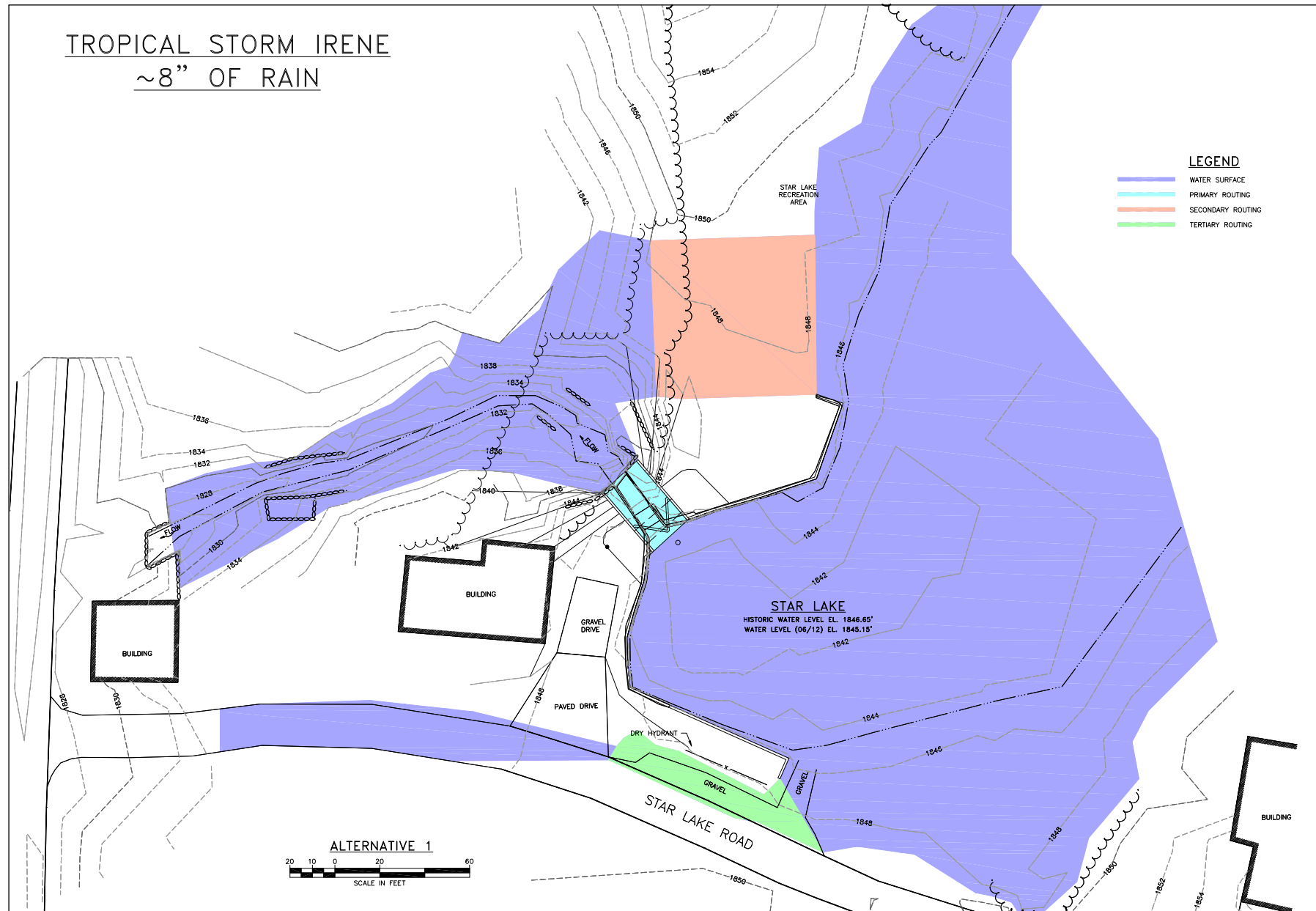
- New concrete training walls
- Articulated concrete blocks on right at beach area
- Concrete overflow section
- Rising stem sluice gate
- Parapet wall along the existing cut-off wall
- Extend the left cut-off wall to the boat launch



Conclusion of Alternative 1

- Hydraulic capacity - water level during storm
- Structural integrity
- Protects the embankment
- New access bridge with light vehicle capacity
- Extend the left cut-off wall to the boat launch

Tropical Storm Irene Flooding with Alternative 1



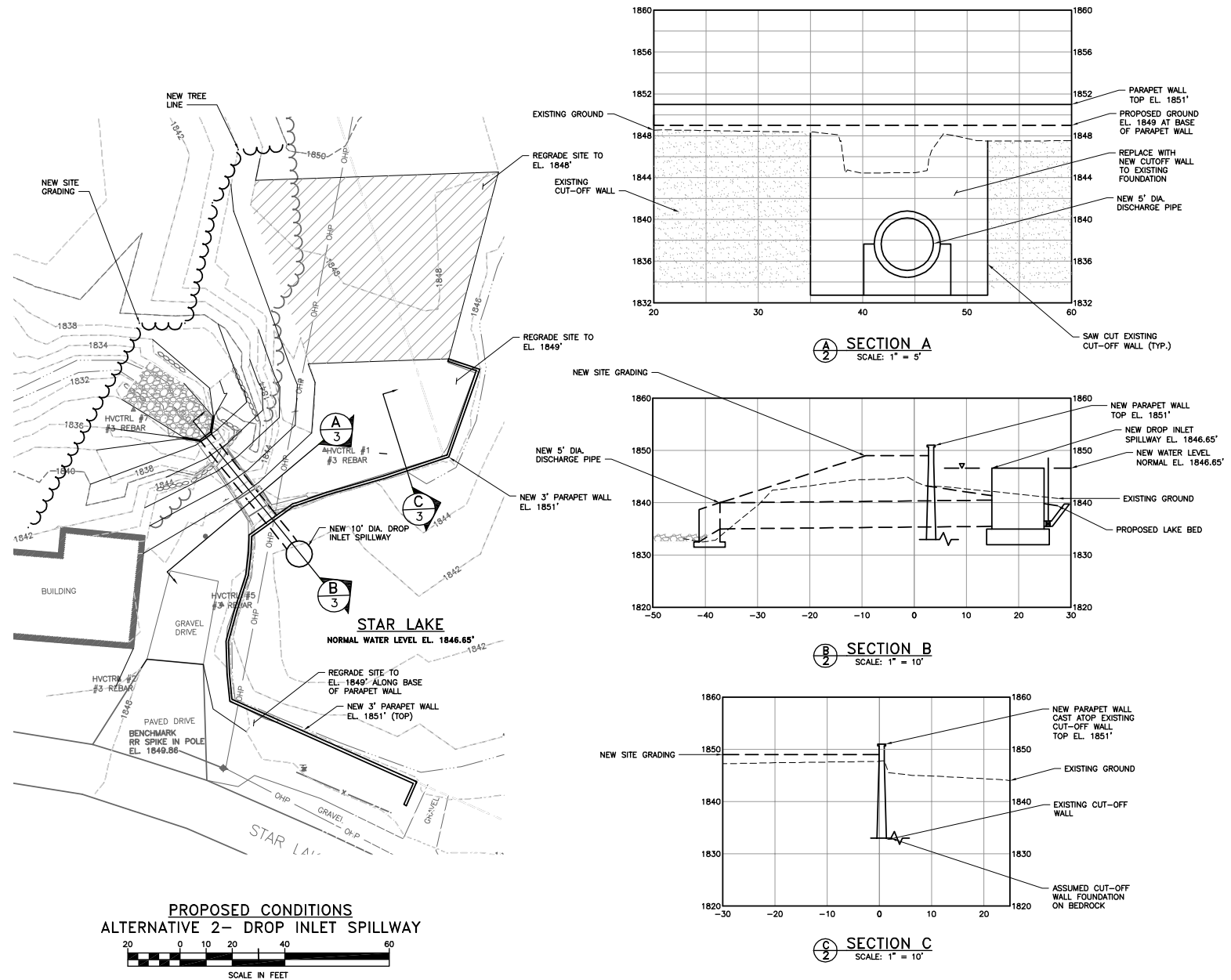
Alternative 2 - Drop Inlet Structure

Address Deficiencies

- Rebuild earth embankment
- Regrade top of dam
- 10-foot diameter drop inlet with 5-foot diameter outlet barrel
- Articulated concrete blocks on right at beach area
- Parapet wall along the existing cut-off wall



Alternative 2 - Drop Inlet Structure



Drop Inlets



Alternative 2 - Summary

Address Deficiencies

- Rebuild earth embankment
- Regrade top of dam
- 10-foot diameter drop inlet with 5-foot diameter outlet barrel
- Articulated concrete blocks on right at beach area
- Parapet wall along the existing cut-off wall

Conclusion of Alternative 2

- Hydraulic capacity - water level during storm
- Structural integrity
- Protection of the embankment
- Bridge not necessary



TROPICAL STORM IRENE
~8" OF RAIN

LEGEND

- WATER SURFACE
- PRIMARY ROUTING
- SECONDARY ROUTING
- TERTIARY ROUTING

STAR LAKE
 HISTORIC WATER LEVEL EL. 1846.65'
 WATER LEVEL (06/12) EL. 1845.15'

EXISTING CONDITIONS

SCALE IN FEET

20 10 0 20 60

STAR LAKE RECREATION AREA

BUILDING

BUILDING

BUILDING

GRAVEL DRIVE

PAVED DRIVE

STAR LAKE ROAD

GRAVEL

GRAVEL

1836 1834 1832 1830 1828 1826 1824 1822 1820 1818 1816 1814 1812 1810 1808 1806 1804 1802 1800 1798 1796 1794 1792 1790 1788 1786 1784 1782 1780 1778 1776 1774 1772 1770 1768 1766 1764 1762 1760 1758 1756 1754 1752 1750 1748 1746 1744 1742 1740 1738 1736 1734 1732 1730 1728 1726 1724 1722 1720 1718 1716 1714 1712 1710 1708 1706 1704 1702 1700 1698 1696 1694 1692 1690 1688 1686 1684 1682 1680 1678 1676 1674 1672 1670 1668 1666 1664 1662 1660 1658 1656 1654 1652 1650 1648 1646 1644 1642 1640 1638 1636 1634 1632 1630 1628 1626 1624 1622 1620 1618 1616 1614 1612 1610 1608 1606 1604 1602 1600 1598 1596 1594 1592 1590 1588 1586 1584 1582 1580 1578 1576 1574 1572 1570 1568 1566 1564 1562 1560 1558 1556 1554 1552 1550 1548 1546 1544 1542 1540 1538 1536 1534 1532 1530 1528 1526 1524 1522 1520 1518 1516 1514 1512 1510 1508 1506 1504 1502 1500 1498 1496 1494 1492 1490 1488 1486 1484 1482 1480 1478 1476 1474 1472 1470 1468 1466 1464 1462 1460 1458 1456 1454 1452 1450 1448 1446 1444 1442 1440 1438 1436 1434 1432 1430 1428 1426 1424 1422 1420 1418 1416 1414 1412 1410 1408 1406 1404 1402 1400 1398 1396 1394 1392 1390 1388 1386 1384 1382 1380 1378 1376 1374 1372 1370 1368 1366 1364 1362 1360 1358 1356 1354 1352 1350 1348 1346 1344 1342 1340 1338 1336 1334 1332 1330 1328 1326 1324 1322 1320 1318 1316 1314 1312 1310 1308 1306 1304 1302 1300 1298 1296 1294 1292 1290 1288 1286 1284 1282 1280 1278 1276 1274 1272 1270 1268 1266 1264 1262 1260 1258 1256 1254 1252 1250 1248 1246 1244 1242 1240 1238 1236 1234 1232 1230 1228 1226 1224 1222 1220 1218 1216 1214 1212 1210 1208 1206 1204 1202 1200 1198 1196 1194 1192 1190 1188 1186 1184 1182 1180 1178 1176 1174 1172 1170 1168 1166 1164 1162 1160 1158 1156 1154 1152 1150 1148 1146 1144 1142 1140 1138 1136 1134 1132 1130 1128 1126 1124 1122 1120 1118 1116 1114 1112 1110 1108 1106 1104 1102 1100 1098 1096 1094 1092 1090 1088 1086 1084 1082 1080 1078 1076 1074 1072 1070 1068 1066 1064 1062 1060 1058 1056 1054 1052 1050 1048 1046 1044 1042 1040 1038 1036 1034 1032 1030 1028 1026 1024 1022 1020 1018 1016 1014 1012 1010 1008 1006 1004 1002 1000 998 996 994 992 990 988 986 984 982 980 978 976 974 972 970 968 966 964 962 960 958 956 954 952 950 948 946 944 942 940 938 936 934 932 930 928 926 924 922 920 918 916 914 912 910 908 906 904 902 900 898 896 894 892 890 888 886 884 882 880 878 876 874 872 870 868 866 864 862 860 858 856 854 852 850 848 846 844 842 840 838 836 834 832 830 828 826 824 822 820 818 816 814 812 810 808 806 804 802 800 798 796 794 792 790 788 786 784 782 780 778 776 774 772 770 768 766 764 762 760 758 756 754 752 750 748 746 744 742 740 738 736 734 732 730 728 726 724 722 720 718 716 714 712 710 708 706 704 702 700 698 696 694 692 690 688 686 684 682 680 678 676 674 672 670 668 666 664 662 660 658 656 654 652 650 648 646 644 642 640 638 636 634 632 630 628 626 624 622 620 618 616 614 612 610 608 606 604 602 600 598 596 594 592 590 588 586 584 582 580 578 576 574 572 570 568 566 564 562 560 558 556 554 552 550 548 546 544 542 540 538 536 534 532 530 528 526 524 522 520 518 516 514 512 510 508 506 504 502 500 498 496 494 492 490 488 486 484 482 480 478 476 474 472 470 468 466 464 462 460 458 456 454 452 450 448 446 444 442 440 438 436 434 432 430 428 426 424 422 420 418 416 414 412 410 408 406 404 402 400 398 396 394 392 390 388 386 384 382 380 378 376 374 372 370 368 366 364 362 360 358 356 354 352 350 348 346 344 342 340 338 336 334 332 330 328 326 324 322 320 318 316 314 312 310 308 306 304 302 300 298 296 294 292 290 288 286 284 282 280 278 276 274 272 270 268 266 264 262 260 258 256 254 252 250 248 246 244 242 240 238 236 234 232 230 228 226 224 222 220 218 216 214 212 210 208 206 204 202 200 198 196 194 192 190 188 186 184 182 180 178 176 174 172 170 168 166 164 162 160 158 156 1

Project Costs

Cost Elements	Alternative 1 Labyrinth Weir	Alternative 2 Drop Inlet
Dam Construction Costs	\$480,000–\$600,000	\$250,000–\$310,000
Engineering Costs	~\$50,000	~\$40,000
TOTAL	\$530,000–\$650,000	\$290,000–\$350,000

Questions and Discussion

