APPENDIX E
DRY CREEK DITCH NO. 2 PIPING PLANS

CONSTRUCTION PLANS
FOR

DRY CREEK DITCH NO. 2 PIPING AND REALIGNMENT

5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD
LOCATED IN THE SW1/4 OF SECTION 3 AND THE SE1/4
OF SECTION 4, ALL IN T1S, R70W OF THE 6TH P.M.,
COUNTY OF BOULDER, STATE OF COLORADO

22 OCTOBER 2008

REVISED 30 APRIL 2010

PREPARED BY:

Drexel, Barrell & Co.
Engineers • Surveyors
1800 38TH STREET
BOULDER, COLORADO 80301
(303) 442-4338

CONTACT:
JAMES BRZOSTOWICZ, P.E.

PREPARED FOR:

BCC, LLC
1526 SPRUCE STREET, SUITE 260
BOULDER CO, 80302
(303) 949-1322
CONTACT: MICHAEL BOYERS

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GENERAL CONSTRUCTION NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF TRANSPORTATION [CDOT] "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION THEREOF, UNLESS OTHERWISE NOTED HEREIN.

2. THE APPROVAL OF A CONSTRUCTION PLAN DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF CONSTRUCTING WORKABLE IMPROVEMENTS. ALL REVISIONS AND/OR CORRECTIONS REQUIRED WILL BE SOLELY THE CONTRACTOR'S RESPONSIBILITY, AND AT THEIR EXPENSE.

3. UTILITY LOCATIONS SHOWN REFLECT AVAILABLE RECORD DATA. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITY LINES SHOWN AND OTHER UTILITY LINES OTHERWISE LOCATED. THE CONTRACTOR SHALL CONTACT THE "UTILITY NOTIFICATION CENTER OF COLORADO" AT 1-800-922-1987 FOR UTILITY LOCATES 24 HOURS PRIOR TO BEGINNING CONSTRUCTION.

4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND PROVIDE FOR ADEQUATE DRAINAGE THROUGH THE SITE DURING THE PROCESS OF EXCAVATION, GRADING AND EMBANKMENT. THE GRADE SHALL BE MAINTAINED IN SUCH CONDITION THAT IT IS WELL DRAINED AT ALL TIMES.

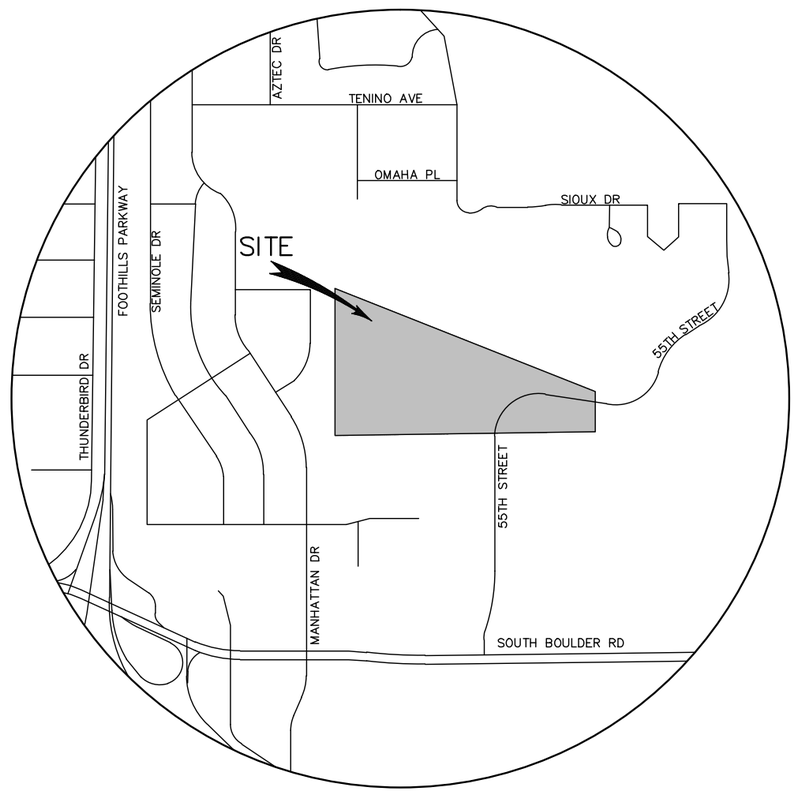
5. THE CONTRACTOR SHALL OBTAIN AND MAINTAIN A COMPLETE AND APPROVED SET OF CONSTRUCTION PLANS. THESE DRAWINGS, AND ANY REQUIRED PERMITS, SHALL BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES AND SHALL BE MADE AVAILABLE UPON REQUEST.

6. SHOULD A TRAFFIC CONTROL PLAN BE DEEMED NECESSARY, THE CONTRACTOR AGREES TO COMPLY WITH THE PROVISIONS OF THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES," PART IV, FOR CONSTRUCTION SIGNAGE AND TRAFFIC CONTROL.

7. ALL SURPLUS MATERIALS, TOOLS AND TEMPORARY STRUCTURES, FURNISHED BY THE CONTRACTOR, SHALL BE REMOVED FROM THE PROJECT SITE BY THE CONTRACTOR. ALL DEBRIS AND RUBBISH CAUSED BY THE OPERATIONS OF THE CONTRACTOR SHALL BE REMOVED, AND THE AREA OCCUPIED DURING CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO ITS ORIGINAL CONDITION, WITHIN 48 HOURS OF PROJECT COMPLETION, UNLESS OTHERWISE DIRECTED BY THE DITCH COMPANY OR PROPERTY OWNERS.

8. THE CONTRACTOR IS REQUIRED TO PROVIDE AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT "URBAN STORM DRAINAGE CRITERIA MANUAL VOLUME 3", THE M-STANDARD PLANS OF THE COLORADO DEPARTMENT OF TRANSPORTATION, AND THE EROSION CONTROL REQUIREMENTS NOTED HEREIN. THE CONTRACTOR MAY BE REQUIRED TO PROVIDE ADDITIONAL EROSION CONTROL MEASURES DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE PLANS DO NOT FUNCTION AS INTENDED.

9. CONSTRUCTION AND MAINTENANCE ACCESS SHALL BE FROM PROPERTY DRIVEWAY ENTRANCE ON 55TH STREET. ACCESS FROM KEWANEE DRIVE IS RESTRICTED.



VICINITY MAP
SCALE: 1" = 1000'

BENCHMARK

CITY OF BOULDER BENCHMARK V3-5 LOCATED AT THE NORTHWEST CORNER OF MOHAWK AND BASELINE ROAD. DESCRIPTION: CUT BOX ON TOP OF CURB 0.5-FT EAST OF SOUTHEAST CORNER OF CATCH BASIN SLAB.
ELEVATION = 5295.95 (CITY OF BOULDER DATUM)

NOTE:
FOR NGVD 1929 DATUM ADJUSTMENT ADD 0.4-FT TO ELEVATIONS SHOWN HEREIN.
FOR NAVD 1988 DATUM ADJUSTMENT ADD 3.43-FT TO ELEVATIONS SHOWN HEREIN.

BASIS OF BEARINGS

THE BASIS OF BEARINGS IS THE WESTERLY LINE OF THE SUBJECT PROPERTIES, BEING MONUMENTED AS SHOWN ON THE ALTA/ACSM LAND TITLE SURVEY OF A TRACT OF LAND LOCATED IN THE SW1/4 OF SECTION 3 AND THE SE1/4 OF SECTION 4, ALL IN T1S, R70W OF THE 6TH P.M., COUNTY OF BOULDER, STATE OF COLORADO, WITH THE LINE ASSUMED TO BEAR N00°10'19"E.

REFERENCE DRAWING NO. BB1-20A PREAPRED BY DREXEL, BARRELL & CO. DATED 17 OCTOBER 2007. (JOB NO. 3873-9)

CALL UTILITY NOTIFICATION
CENTER OF COLORADO

1-800-922-1987

CALL 2-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.

NOT FOR CONSTRUCTION
PERMIT REVIEW ISSUE

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SIGNATURE AND DATE

REVISION DESCRIPTIONS	DATE

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SHEET 1 OF 9

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DRY CREEK DITCH NO. 2 PIPING NOTES

1. TRENCHING AND BACKFILL SHALL BE DONE IN ACCORDANCE WITH THE CDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION THEREOF.

2. ALL PIPING AND MATERIAL SHALL BE OF THE TYPE AND MATERIALS SPECIFIED HEREIN. THE USE OF MATERIALS OTHER THAN THOSE SPECIFIED HEREIN REQUIRE APPROVAL FROM THE ENGINEER. ALL MATERIALS SHALL BE NEW AND UNUSED. ALL PIPE SIZES AND REFERENCES TO PIPE DIAMETER ON THE DRAWINGS OR IN THE SPECIFICATIONS ARE INTENDED TO BE THE NOMINAL INSIDE DIAMETER, AND SHALL BE INTERPRETED AS SUCH.

3. ANY SECTION OF THE DRY CREEK DITCH NO. 2 PIPING THAT IS FOUND DEFECTIVE IN TESTS, MATERIALS, ALIGNMENT, GRADE OR JOINTS SHALL BE CORRECTED BY CONTRACTOR.

4. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION RECOMMENDATIONS FOR EACH TYPE OF PIPE TO EACH FOREMAN AND INSPECTOR PRIOR TO CONSTRUCTION. THESE INSTALLATION RECOMMENDATIONS SHALL BE FOLLOWED DURING CONSTRUCTION UNLESS OTHERWISE ALLOWED BY THE ENGINEER. THESE SPECIFICATIONS TAKE PRIORITY OVER THE MANUFACTURER'S INSTALLATION RECOMMENDATIONS.

5. THE ENGINEER RESERVES THE RIGHT TO REQUIRE TESTING OF PIPE AND MATERIALS AFTER DELIVERY AND TO REJECT ALL PIPE OR MATERIALS REPRESENTED BY THE SAMPLE WHICH FAIL TO COMPLY WITH THE SPECIFIED REQUIREMENTS.

6. CIRCULAR REINFORCED CONCRETE PIPE SHALL MEET THE REQUIREMENTS OF ASTM C76 AND THE REQUIREMENTS CONTAINED HEREIN. PIPE LAYING LENGTHS SHALL BE A MINIMUM OF 7'-6". THE PIPE SHALL BE CLASS III STRENGTH CLASSIFICATION. BEDDING FOR CONCRETE PIPE SHALL BE A MINIMUM OF SIX (6) INCHES BELOW THE PIPE TO SPRINGLINE OR MIDPOINT OF THE PIPE.

7. GASKETS SHALL BE RUBBER O-RING TYPE PER ASTM C361 AND ASTM C443. GASKETS WILL BE USED IN A BELL AND SPIGOT JOINT.

8. ALL RCP SHALL BE CONSTRUCTED WITH TYPE II MODIFIED CEMENT. THE ABSORPTION OF THE CONCRETE SHALL NOT EXCEED 5.5%.

9. EACH PIPE JOINT SHALL CONFORM TO ASTM C361, SECTION 8, WITH THE GASKETS CONFINED IN A GROOVE CAST IN THE PIPE SPIGOT. PIPE WITH COLLARS IN LIEU OF INTEGRAL CAST BELLS WILL NOT BE ACCEPTED. THE PIPE JOINTS SHALL BE DESIGNED TO WITHSTAND, WITHOUT CRACKING, THE GASKET COMPRESSION PLUS A DIFFERENTIAL LOAD ACROSS THE JOINT EQUAL TO 4,000 POUNDS PER FOOT OF INSIDE DIAMETER.

10. EACH PIECE OF RCP SHALL BE PLAINLY AND PERMANENTLY MARKED SHOWING THE PIPE CLASS, DATE OF MANUFACTURE, AND THE MANUFACTURER'S NAME OR MARK. THESE MARKINGS SHALL BE MADE ON THE OUTSIDE OF THE PIPE BEFORE CURING OR SHALL BE PAINTED ON THE PIPE USING WATERPROOF PAINT.

11. 12-INCH IRRIGATION LINE SHALL BE POLYVINYL CHLORIDE [PVC] PIPE MANUFACTURED IN ACCORDANCE WITH ASTM D3034.

12. PVC PIPE SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS OF ASTM D2321.

13. PVC PIPE JOINTS SHALL MEET THE REQUIREMENTS OF ASTM D3212.

14. NO MANHOLES MAY BE LOCATED IN AREAS WHERE PONDING OR STORM DETENTION BASINS ARE TO BE USED. MANHOLES MUST BE SPACED NO FARTHER APART THAN FOUR HUNDRED (400) FEET FOR PIPES WITH INSIDE DIAMETERS OF FIFTEEN (15) INCHES TO THIRTY-SIX (36) INCHES, AND SIX HUNDRED (600) FEET APART FOR PIPES WITH INSIDE DIAMETERS OF FORTY-TWO (42) INCHES AND LARGER.

15. ALL END SECTIONS AND OUTFALLS SHALL HAVE A CAST-IN-PLACE REINFORCED CONCRETE HEADWALL OR PRE-MANUFACTURED FLARED END SECTION AS APPROVED BY THE ENGINEER. PRE-MANUFACTURED END SECTIONS SHALL BE MANUFACTURED OF THE SAME MATERIALS AS THE PIPE TO WHICH THEY ARE CONNECTED AND SHALL MEET THE MINIMUM MATERIAL SPECIFICATIONS APPLYING TO THE PIPE.

16. ALL END SECTIONS SHALL HAVE A TRASH RACK WITH A GALVANIZED COATING.

17. ALL PIPE, FITTINGS, AND ACCESSORIES SHALL BE CAREFULLY LOWERED INTO THE TRENCH WITH SUITABLE EQUIPMENT IN A MANNER THAT WILL PREVENT DAMAGE TO THE PIPE. UNDER NO CIRCUMSTANCES SHALL PIPE OR ACCESSORIES BE DROPPED OR DUMPED INTO THE TRENCH. ALL FOREIGN MATTER OR DIRT SHALL BE REMOVED FROM THE INTERIOR OF THE PIPE AND THE ACCESSORIES BEFORE LOWING INTO THE TRENCH. THE PIPE SHALL BE KEPT CLEAN DURING AND AFTER INSTALLATION.

18. PIPE SHALL BE LAID TO A TRUE LINE AND AT A UNIFORM RATES OF GRADE AS SHOWN ON THESE PLANS. FINE GRADING THE TRENCH SHALL PROCEED AHEAD OF PIPE LAYING.

19. BEDDING MATERIAL SHALL BE IN ACCORDANCE WITH CDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION THEREOF.

20. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH CDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION THEREOF.

21. ALL MANHOLES SHALL BE CONSTRUCTED WITH A WATERTIGHT, GASTKETED, BOLTED TYPE COVER AND THE MANHOLE RING SHALL BE BOLTED TO MANHOLE CONE OR BASE.

22. ALL CONCRETE AND STEEL REINFORCING WORK SHALL BE IN ACCORDANCE WITH THE CDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION THEREOF.

23. HEADWALLS MUST BE CAST IN PLACE.

24. PRIOR TO FINAL ACCEPTANCE OF THE WORK, THE PIPING SHALL BE CLEANED BY APPROPRIATE METHODS. THE PIPING SHALL BE AIR TESTED PRIOR TO FINAL ACCEPTANCE.

25. ANY VISIBLE INFILTRATION WHICH THE ENGINEER CONSIDERS TO BE DETRIMENTAL TO THE SYSTEM SHALL BE REPAIRED IN A MANNER APPROVED BY THE ENGINEER BEFORE THE WORK WILL BE ACCEPTED. NO MANHOLE WILL BE ACCEPTED THAT HAS ANY INFILTRATION.

26. UPON COMPLETION OF CONSTRUCTION, THE ENGINEER WILL CAREFULLY INSPECT THE PIPING AND APPURTANCES. ANY UNSATISFACTORY WORK SHALL BE REMOVED AND REPLACED IN A PROPER MANNER. THE INVERTS OF THE MANHOLES SHALL BE LEFT SMOOTH, CLEAN AND FREE FROM OBSTRUCTIONS THROUGHOUT THE ENTIRE LENGTH. MANHOLE RINGS AND COVERS MUST BE RAISED TO FINISHED GRADE BEFORE ACCEPTANCE OF THE PIPING.

STORM WATER QUALITY AND EROSION CONTROL NOTES

1. ALL TEMPORARY EROSION CONTROL FACILITIES SHALL BE INSTALLED BEFORE ANY CONSTRUCTION ACTIVITIES TAKE PLACE.

2. SOLID WASTE, INDUSTRIAL WASTE, YARD WASTE AND ANY OTHER POLLUTANTS OR WASTE ON ANY CONSTRUCTION SITE SHALL BE CONTROLLED THROUGH THE USE OF BMP'S. WASTE AND/OR RECYCLING CONTAINERS SHALL BE PROVIDED AND MAINTAINED BY THE OWNER OR CONTRACTOR ON CONSTRUCTION SITES WHERE THERE IS THE POTENTIAL FOR RELEASE OF WASTE. UNCONTAINED WASTE THAT MAY BLOW, WASH OR OTHERWISE BE RELEASED FROM THE SITE IS PROHIBITED. SANITARY WASTE FACILITIES SHALL BE PROVIDED AND MAINTAINED BY THE OWNER OR CONTRACTOR.

3. READY-MIXED CONCRETE, OR ANY MATERIALS RESULTING FROM THE CLEANING OF VEHICLES OR EQUIPMENT CONTAINING OR USED IN TRANSPORTING OR APPLYING IT, SHALL BE CONTAINED ON CONSTRUCTION SITES FOR PROPER DISPOSAL. RELEASE OF THESE MATERIALS IS PROHIBITED.

4. COVER SHALL BE APPLIED WITHIN 14 DAYS TO INACTIVE SOIL STOCKPILES, AND SHALL BE MAINTAINED FOR STOCKPILES THAT ARE PROPOSED TO REMAIN IN PLACE LONGER THAN 30 CALENDAR DAYS.

5. BMP's SHALL BE IMPLEMENTED TO PREVENT THE RELEASE OF SEDIMENT FROM CONSTRUCTION SITES. VEHICLE TRACKING OF MUD SHALL NOT BE ALLOWED TO ENTER THE STORM WATER SYSTEM OR WATERS OF THE STATE. SEDIMENT TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED.

6. TECHNIQUES SHALL BE USED TO PREVENT DUST, SEDIMENT OR DEBRIS BLOWING FROM THE SITE.

7. STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION OR DEGRADATION OF WATERS OF THE STATE.

8. ALL EARTH DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED AND COMPLETED TO LIMIT THE EXPOSED AREA OF ANY DISTURBED LAND TO THE SHORTEST POSSIBLE PERIOD OF TIME.

9. BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE ADEQUATE PROTECTION SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING THE STORM WATER SYSTEM OR WATERS OF THE STATE.

10. ANY DISTURBANCE TO TEMPORARY AND PERMANENT BMP's SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS.

11. THE PROPERTY OWNER AND SUBSEQUENT PROPERTY OWNERS WILL BE RESPONSIBLE FOR CONTINUED COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, DURING CONSTRUCTION ACTIVITY ON THE SITE.

12. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED AND DISPOSED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED, OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, WHICHEVER OCCURS FIRST.

13. PRE-DISTURBANCE VEGETATION SHALL BE PROTECTED AND RETAINED WHEREVER POSSIBLE. REMOVAL OR DISTURBANCE OF EXISTING VEGETATION SHALL BE LIMITED TO THE AREA REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATIONS, AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME.

14. ALL SOILS EXPOSED DURING LAND DISTURBING ACTIVITY (STRIPPING, GRADING, UTILITY INSTALLATIONS, STOCKPILING, FILLING, ETC.) SHALL BE KEPT IN A ROUGHENED CONDITION BY RIPPING OR DISCING ALONG LAND CONTOURS UNTIL MULCH, VEGETATION, OR OTHER PERMANENT EROSION CONTROL IS INSTALLED. NO SOILS IN AREAS OUTSIDE PROJECT LIMITS SHALL REMAIN EXPOSED BY LAND DISTURBING ACTIVITY FOR MORE THAN THIRTY (30) DAYS BEFORE REQUIRED TEMPORARY OR PERMANENT EROSION CONTROL (E.G. SEED/MULCH, LANDSCAPING, ETC.) IS INSTALLED.

15. NO SOIL STOCKPILE SHALL EXCEED TEN (10) FEET IN HEIGHT. ALL SOIL STOCKPILES SHALL BE PROTECTED FROM SEDIMENT TRANSPORT BY SURFACE ROUGHENING, WATERING, AND PERIMETER SILT FENCING.

16. LOCAL ORDINANCE PROHIBITS THE TRACKING, DROPPING, OR DEPOSITING OF SOILS OR ANY OTHER MATERIAL ONTO STREETS BY OR FROM ANY VEHICLE. CONTRACTOR SHALL INSTALL VEHICLE TRACKING CONTROL AT DESIGNATED ENTRANCES. ANY INADVERTENTLY DEPOSITED MATERIAL SHALL BE CLEANED IMMEDIATELY BY THE CONTRACTOR.

17. THE CONSTRUCTION ENTRANCE SHALL HAVE A VEHICLE TRACKING CONTROL PAD INSTALLED TO PREVENT TRACKING ONTO THE ADJACENT PUBLIC STREET. SEE DETAIL SHEET 10.

18. CRIMPED STRAW MULCH SHALL BE PLACED OVER ALL DISTURBED AREAS REQUIRING SEEDING.

19. ALL TOPSOIL SHALL BE SALVAGED. TOPSOIL AND OVERBURDEN SHALL BE REDISTRIBUTED WITHIN THE GRADED AREA AFTER ROUGH GRADING TO PROVIDE A SUITABLE BASE FOR AREAS WHICH WILL BE SEEDED AND PLANTED. RUNOFF FROM STOCKPILED AREAS SHALL BE CONTROLLED TO PREVENT EROSION.

20. FUGITIVE DUST EMISSIONS RESULTING FROM GRADING ACTIVITIES AND/OR WIND SHALL BE CONTROLLED USING THE BEST AVAILABLE CONTROL TECHNOLOGY, AS DEFINED BY THE COLORADO DEPARTMENT OF HEALTH, AT THE TIME OF GRADING.

21. DISTURBED AREAS SHALL BE RESEEDED WITH NATIVE GRASS MIX. (SEE SEEDING SCHEDULE SHEET 10)

22. SILT FENCING SHALL BE INSTALLED ALONG THE TOES OF THE PIPE EMBANKMENT TO PREVENT SEDIMENT TRANSPORT BEYOND THE PROJECT LIMITS. (SEE DETAIL SHEET 10)

GRADING NOTES

1. ALL PROPOSED CONTOURS ARE TO TOP OF FINISHED PAVING AND LANDSCAPED AREAS UNLESS OTHERWISE NOTED.

2. MAXIMUM LANDSCAPE SLOPE SHALL BE 2(HOR) TO 1(VERT)
MINIMUM SLOPE ON LANDSCAPED AREAS SHALL BE 2.00%
MINIMUM SLOPE ON ASPHALT SURFACES SHALL BE 1.00%
MINIMUM SLOPE ON CONCRETE SURFACES SHALL BE 0.50%
UNLESS OTHERWISE NOTED.

3. PAVING CONTRACTOR SHALL ADJUST MANHOLE COVERS TO THE FINAL GRADES INDICATED ON THESE PLANS.

4. EXISTING SPOT ELEVATIONS AND TOPOGRAPHIC INFORMATION IS FROM A FIELD SURVEY BY DREXEL, BARRELL & CO.

5. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND PROVIDE FOR ADEQUATE DRAINAGE THROUGH THE SITE DURING THE PROCESS OF EXCAVATION, GRADING AND EMBANKMENT. THE GRADE SHALL BE MAINTAINED IN SUCH CONDITION THAT IT IS WELL DRAINED AT ALL TIMES.

6. EROSION CONTROL BLANKETS SHALL BE INSTALLED ON DISTURBED AREAS WHERE SLOPES ARE 4:1 OR STEEPER TO STABILIZE THE SLOPE. EROSION CONTROL BLANKETS SHALL BE WS072 PHOTODEGRADEABLE DOUBLE NET STRAW AS MANUFACTURED BY GREENFIX AMERICA OR APPROVED EQUAL. EROSION CONTROL BLANKETS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

7. EXCESS SOILS GENERATED BY THIS PIPING PROJECT MAY BE ADDED TO THE EASTERN EDGE OF THE PIPING BERM. UNDER NO CIRUMSTANCES SHALL THE EXCESS SOILS BE SPREAD OR WASTED ON THE HOGAN AND PANCOST PROPERTIES.

RESTORATION NOTES

1. WHERE CONTRACTOR DISTURBS EXISTING GROUND SURFACES FOR THE CONSTRUCTION OF IMPROVEMENTS, REPLACEMENT AND RESTORATION OF SITE TO ITS PREEXISTING CONDITION IS REQUIRED.

2. FENCES THAT MUST BE REMOVED AS PART OF THIS PIPING PROJECT MUST BE RESTORED TO A MINIMUM OF THE FENCE'S PREEXISTING CONDITION.

3. NATURAL AREAS SHALL BE RESEEDED WITH NATIVE GRASS MIX AS PER SPECIFICATIONS. SEE SHEET 10 FOR SEEDING SCHEDULE.

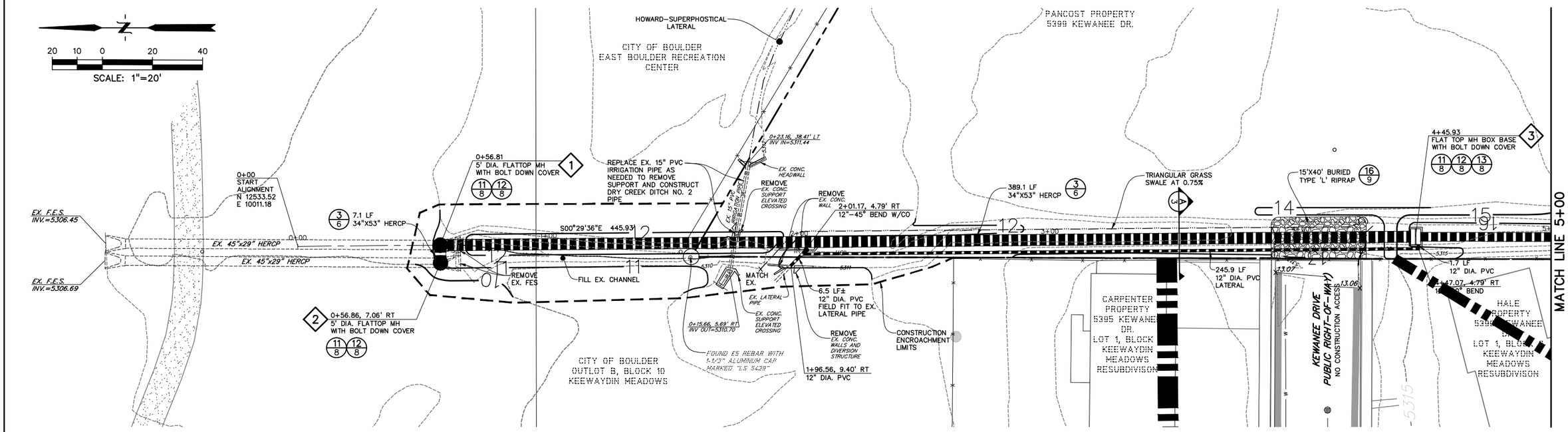
LEGEND

PROPERTY LINE
EASEMENT
RIGHT-OF-WAY
PROPOSED IRRIGATION PIPE
PROPOSED MANHOLE
PROPOSED MANHOLE DESIGNATOR — 1
EX. WATER LINE — W
PROPOSED INTERMEDIATE CONTOUR — 5312
PROPOSED INDEX CONTOUR — 5315
PROPOSED SPOT ELEVATION — x 12.67
EX. INTERMEDIATE CONTOUR — 5364
EX. INDEX CONTOUR — 5365

NOT FOR CONSTRUCTION
PERMIT REVIEW ISSUE

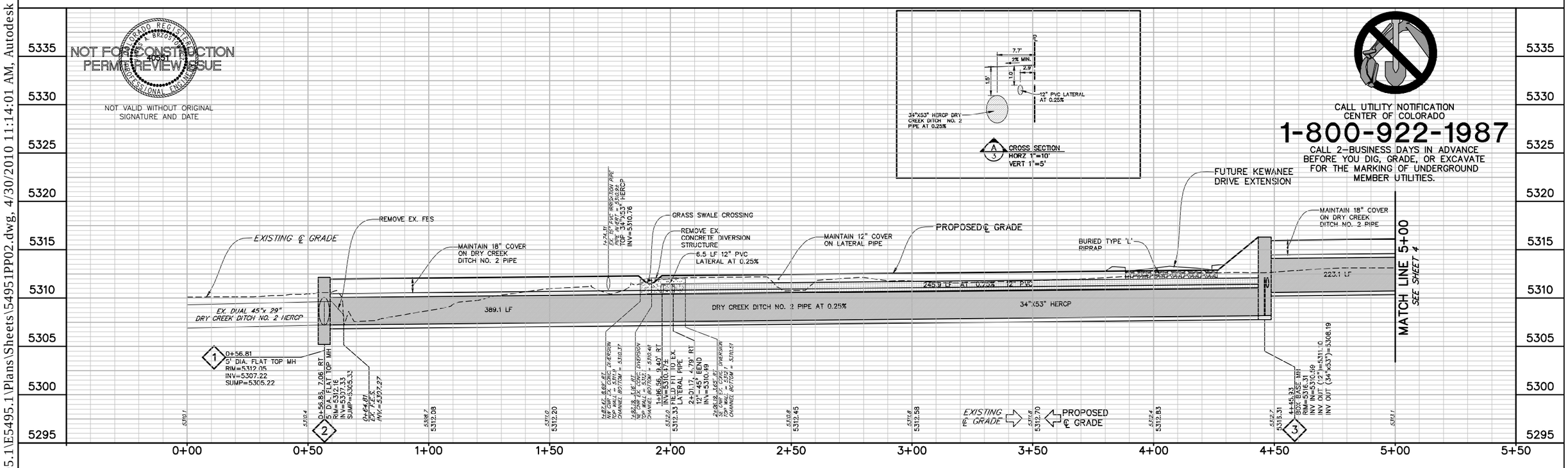
NOT VALID WITHOUT ORIGINAL SIGNATURE AND DATE

PREPARED BY: Drexel, Barrell & Co. Engineers • Surveyors, 1800 38TH STREET BOULDER, COLORADO 80301 (303) 442-4338; COLORADO SPRINGS (719) 260-0887 • GREELEY (970) 351-0645 • STEAMBOAT SPRINGS (970) 879-1523 • GRAND JUNCTION (970) 257-1350; CONTACT: JAMES BRZOSTOWICZ, P.E.	PREPARED FOR: BCC, LLC, 1526 SPRUCE STREET, SUITE 260, BOULDER, COLORADO 80302, (303) 949-1322, CONTACT: MICHAEL BOYERS	PROJECT INFO: CONSTRUCTION PLANS FOR DRY CREEK DITCH NO.2 PIPING AND REALIGNMENT, 5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD, UNINCORPORATED BOULDER COUNTY, COLORADO	DESIGNED BY: LRE; DRAWN BY: LRE; CHECKED BY:	REVISION DESCRIPTIONS / DATE	DRAWING INFO. NOTES AND LEGEND	DATE: 22 OCT 2008; JOB NO: E-5495.1; SHEET 2; SCALE: H: 1"=50' V:; DRAWING NO.: 6D 324; SHEETS 9



DRY CREEK DITCH NO. 2 PIPING

SCALES: HORIZ. 1"= 20' VERT. 1"= 5'



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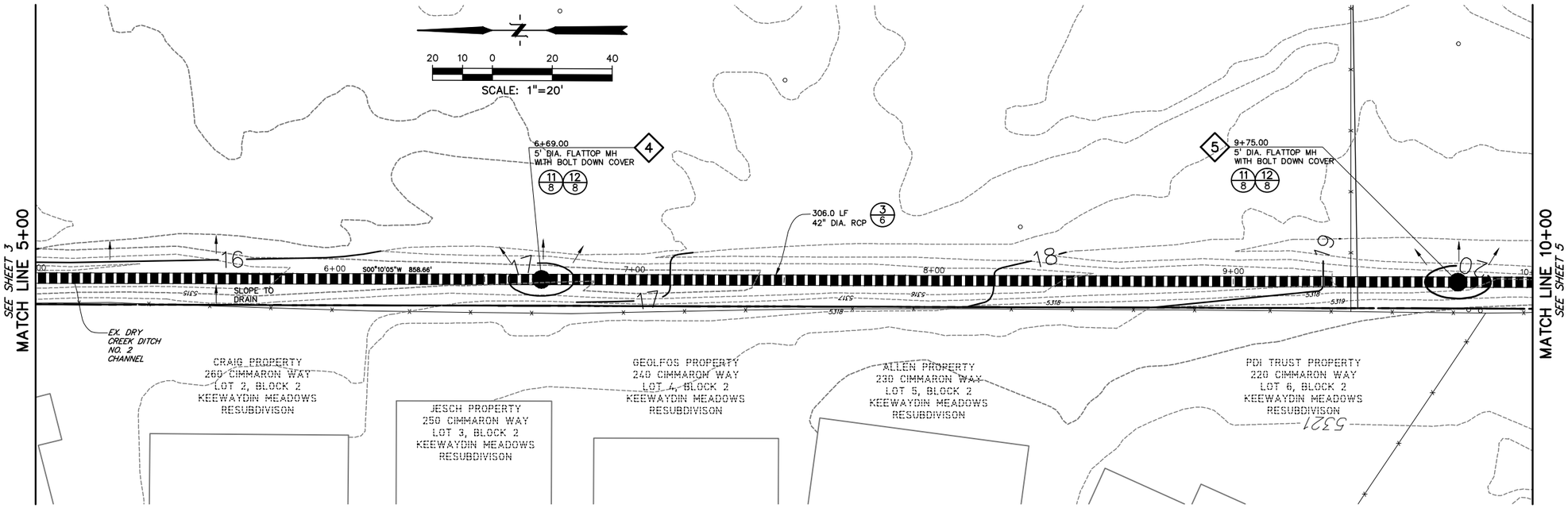

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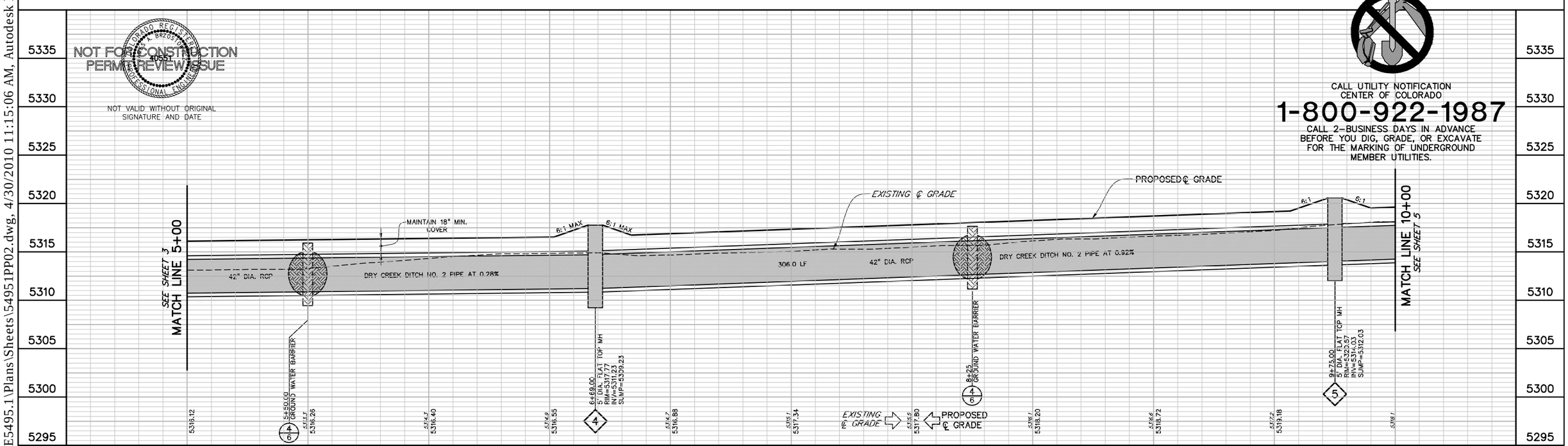

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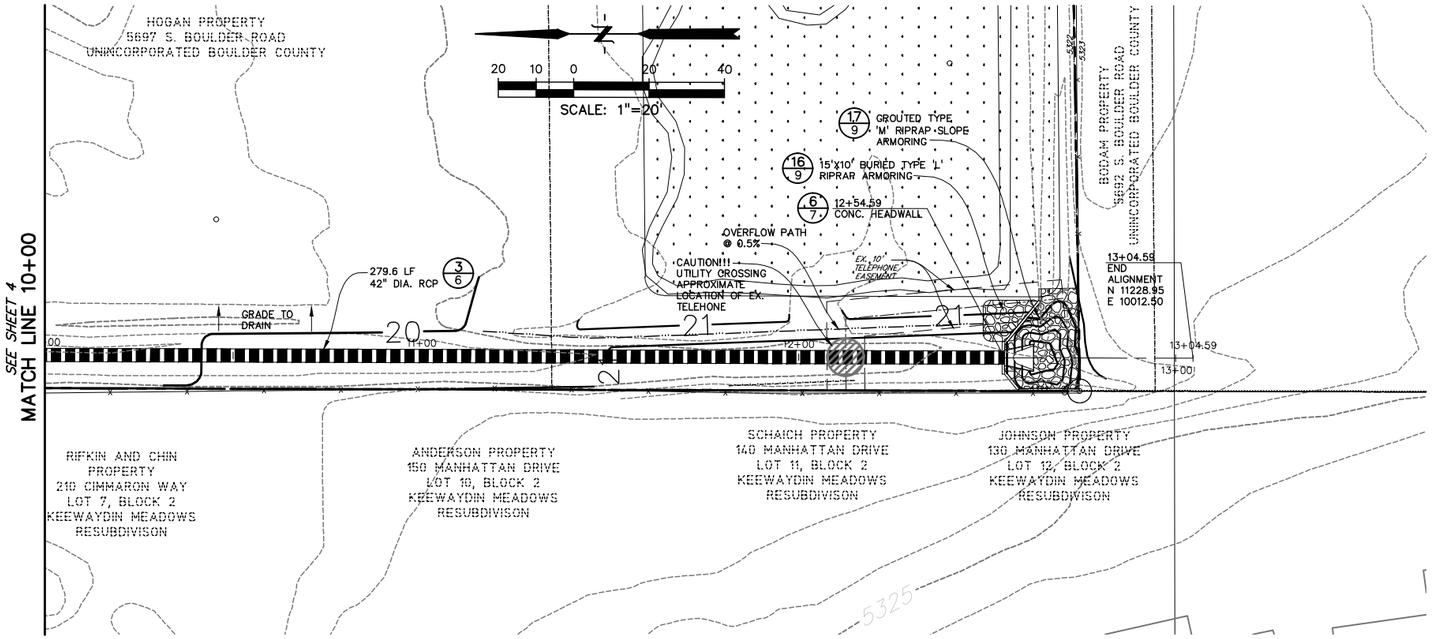

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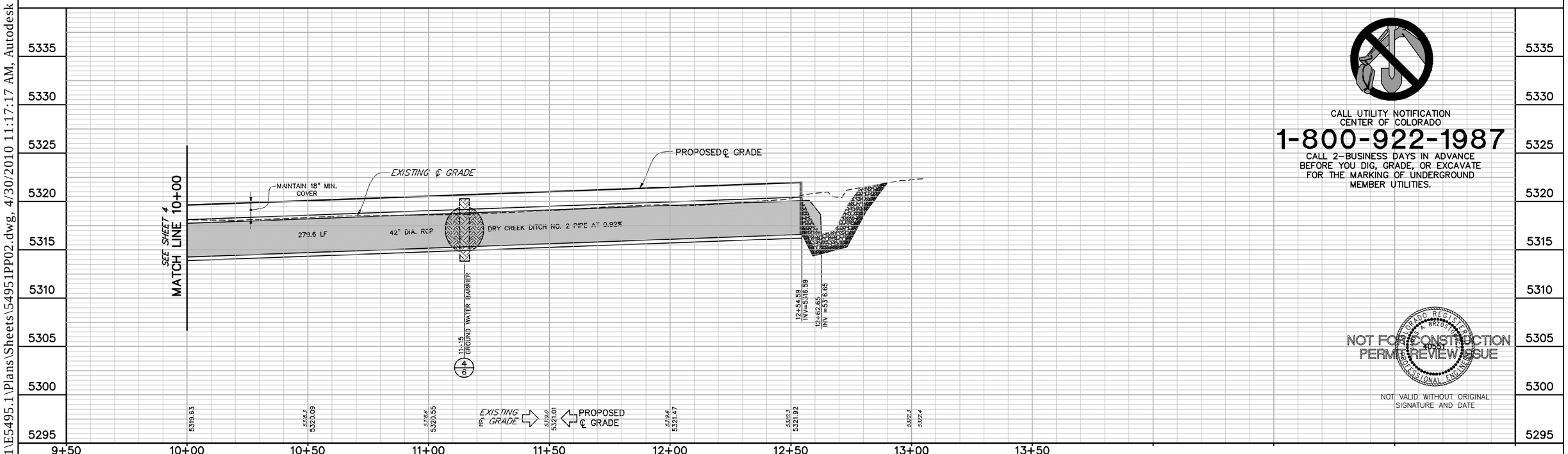
SCALES: HORIZ. 1"= 20'
VERT. 1"= 5'



CALL UTILITY NOTIFICATION CENTER OF COLORADO

1-800-922-1987

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

NOT FOR CONSTRUCTION
PERMIT REVIEW ISSUE

NOT VALID WITHOUT ORIGINAL SIGNATURE AND DATE

PREPARED BY: Drexel, Barrell & Co. Engineers • Surveyors 1800 38TH STREET BOULDER, COLORADO 80301 (303) 442-4338 COLORADO SPRINGS (719) 260-0887 • GREELEY (970) 351-0645 • STEAMBOAT SPRINGS (970) 879-1523 • GRAND JUNCTION (970) 257-1350 CONTACT: JAMES BRZOSTOWICZ, P.E.	PREPARED FOR: BCC, LLC 1526 SPRUCE STREET, SUITE 260 BOULDER, COLORADO 80302 (303) 949-1322 CONTACT: MICHAEL BOYERS	PROJECT INFO: CONSTRUCTION PLANS FOR DRY CREEK DITCH NO.2 PIPING AND REALIGNMENT 5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD UNINCORPORATED BOULDER COUNTY, COLORADO	DESIGNED BY: LRE DRAWN BY: LRE CHECKED BY:	REVISION DESCRIPTIONS DATE	DRAWING INFO. DRY CREEK DITCH NO. 2 PIPING PLAN AND PROFILE 10+00 TO END

DATE:	JOB NO:	SHEET
22 OCT 2008	E-5495.1	5
SCALE: H: 1"=20' V: 1"=5'	DRAWING NO.: 6D 324	SHEETS 9

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H:\E5495.1\E5495.1\Plans\Sheets\54951DT01.dwg, 4/30/2010 11:28:04 AM, Autodesk PDF.pc3

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) Ø				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.166
15	12	62	102	100	100	100
18	12	51	88	100	100	100
18	12	37	57	98	100	94
21	12	55	77	74	71	81
24	12	48	63	85	88	71
27	12	41	44	57	80	63
30	12	37	43	53	54	58
36	12	30	33	42	46	47
42	12	24	27	34	37	41
48	12	20	24	29	31	34
54	12			25	27	31
60	12				24	27
66	12					24
72	12					21

2⅔IN. x ½IN. CORRUGATIONS
ROUND STEEL PIPE

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) Ø				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.168
36	12	53	91	98	100	100
42	12	45	58	84	100	100
48	12	39	49	73	88	98
54	12	35	44	62	79	83
60	12	31	38	54	70	78
66	12	28	35	52	64	71
72	12	26	32	48	58	65
78	12	24	30	42	54	60
84	12	22	28	42	50	56
90	12	21	26	38	46	52
96	12		24	36	44	49
102	12		23	34	41	46
108	12		22	32	39	43
114	12			30	37	41
120	12			29	35	39

3 IN. x 1 IN. CORRUGATIONS
ROUND STEEL PIPE

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) Ø				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.168
42	12	38	48	72	88	98
48	12	32	41	61	76	87
54	12	27	36	52	70	79
60	12	24	32	46	62	71
66	12	22	29	42	56	65
72	12	20	27	38	51	60
78	12	19	24	36	48	55
84	12		23	34	45	51
90	12		22	32	42	48
96	12		21	30	40	45
102	12		20	29	38	43
108	12			28	36	41
114	12			27	34	39
120	12			26	33	38

5 IN. x 1 IN. CORRUGATIONS
ROUND STEEL PIPE

GENERAL NOTES

1. MINIMUM COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE PIPE FROM DAMAGE. THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. THE MINIMUM COVER FOR FLEXIBLE PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT (MIN. OF PCCP).
2. PIPE SHALL BE PLACED WITH LONGITUDINAL SEAMS AT THE SIDES OR QUARTER POINTS BUT NOT ALONG TOP OF VERTICAL AXIS.
3. STRUCTURAL PLATE PIPES OF EQUAL OR GREATER DIAMETER IN CONFORMANCE TO SECTION 707.4 MAY BE SUBSTITUTED FOR THE PIPES ON THESE SHEETS AT THE CONTRACTOR'S EXPENSE.
4. WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL INSTALLATION SHALL BE USED.
5. DIMENSIONS FOR CMP AND PIPE ARCH, WHERE THE CORRUGATIONS ARE THE SAME AND PIPE DIMENSIONS OF THE PIPE TO BE EXTENDED.
6. BEDDING AND CONNECTION SHALL BE IN ACCORDANCE WITH SECTION 206.
7. PIPE HAVING ARTIFICIAL PERIMETER AND ARTIFICIAL SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE SPECIFIED ON THE PLANS SHALL BE PERMITTED.
8. PIPE HAVING 5 INCHES OR ABOVE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CANNOT BE USED WHEN COVER EXCEEDS 11 FT. USE ROUND PIPE.
9. COVER GREATER THAN 10 FT. SHALL BE USED ONLY AFTER FOREMAN INSPECTION OF FOUNDATION MATERIAL.

PIPE SIZE* SPAN x RISE	EQUIV. DIA.	WALL THICKNESS	MIN. COVER	MAX. HEIGHT OF COVER H (FT.)
IN.				CORNER BEARING PRESSURE 2 TONS PER SQ. FT.
17 x 13	15	0.064	12	11
21 x 15	18	0.064	12	8
23 x 18	21	0.064	12	8
27 x 22	24	0.064	12	7
32 x 24	27	0.064	12	6
42 x 29	36	0.064	12	5
49 x 33	42	0.079	12	5
57 x 38	48	0.109	12	5
64 x 43	54	0.109	15	8
71 x 47	60	0.138	15	8
77 x 52	66	0.166	18	8
83 x 57	72	0.166	18	7

2⅔ IN. x ½IN. CORRUGATIONS
STEEL PIPE ARCH Ø

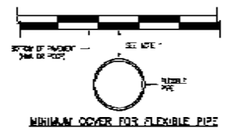
PIPE SIZE* SPAN x RISE	EQUIV. DIA.	WALL THICKNESS	MIN. COVER	MAX. HEIGHT OF COVER H (FT.)
IN.				CORNER BEARING PRESSURE 2 TONS PER SQ. FT.
40 x 31	36	0.064	12	8
48 x 31	42	0.064	12	8
52 x 41	46	0.064	12	8
60 x 36	54	0.064	12	8
58 x 41	50	0.064	12	8
73 x 55	66	0.064	12	10
77 x 58	70	0.064	12	11
83 x 65	76	0.064	12	10
95 x 71	84	0.079	12	11
102 x 71	90	0.109	12	10
112 x 75	96	0.109	12	10
117 x 79	102	0.109	12	10
128 x 83	108	0.138	12	9
137 x 87	114	0.138	12	8
142 x 91	120	0.138	12	8

3 IN. x 1 IN. AND 5 IN. x 1 IN. CORRUGATIONS
STEEL PIPE ARCH Ø

TYPE AND MATERIAL	DIA. (IN.)	MAX. HEIGHT OF COVER H (FT.)
CORRUGATED POLYETHYLENE (CORR)	12 TO 42	20
RIBBED POLYETHYLENE (CORR)	18 TO 30	20
RIBBED POLYVINYL CHLORIDE (PVC)	18 TO 36	20

TL-4 CORR REQUIREMENTS GREATER THAN THE MAXIMUM ALLOWABLE HEIGHT OF COVER LISTED REQUIRE SPECIAL DESIGN.

PLASTIC PIPE



MINIMUM COVER FOR FLEXIBLE PIPE

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Computer File Information	Sheet Revisions		
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Last Modification Date: 07/24/08 Initials: TA			
Full Path: www.dot.state.co.us/CompSupport/			
Drawing File Name: M603D1.01.dwg			
DGN Ver: MicroStation V8 Scale: Not to Scale Units: English			

Colorado Department of Transportation
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Denver, Colorado 80222
Phone: (303) 757-9283
Fax: (303) 757-2820
Project Development Branch SRJ/LTA

METAL AND PLASTIC PIPE

STANDARD PLAN NO. M-603-1

Sheet No. 1 of 2

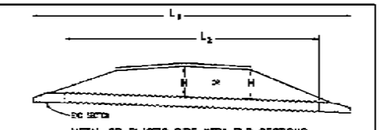
Issued by Project Development Branch on July 04, 2008

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) Ø				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.105	0.135	0.164
12	12	54	92	96	100	100
15	12	42	62	69	75	74
18	12	32	52	57	65	62
21	12	28	38	49	57	53
24	12	28	38	43	48	48
27	12	25	33	38	42	47
30	12		32	34	38	41
36	12		28	33	40	38
42	12			29	35	33
48	12			26	32	31
54	12			24	29	31
60	12				26	29
66	12				24	27
72	12					24

2⅔IN. x ½ IN. CORRUGATIONS
ROUND ALUMINUM PIPE Ø

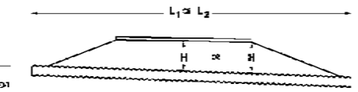
PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) Ø				
		WALL THICKNESS (IN.)				
IN.		0.060	0.075	0.105	0.135	0.164
36	12	38	48	62	80	80
42	12	32	41	54	70	70
48	12	28	36	48	62	62
54	12	25	32	43	56	56
60	12	23	29	39	51	51
66	12	21	26	36	46	47
72	12	19	24	33	42	43
78	12		22	30	39	40
84	12		21	28	36	37
90	12		20	26	34	35
96	12		19	25	32	33
102	12			24	30	31
108	12			23	29	30
114	12				28	29
120	12				27	28

3 IN. x 1 IN. CORRUGATIONS
ROUND ALUMINUM PIPE Ø



METAL OR PLASTIC PIPE WITH END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT

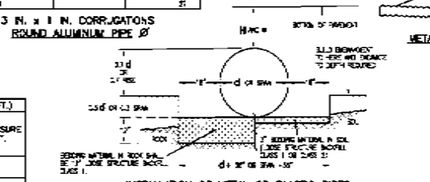


METAL OR PLASTIC PIPE WITHOUT END SECTIONS

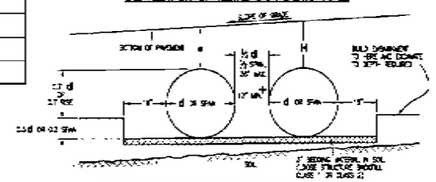
NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT

PIPE SIZE* SPAN x RISE	EQUIV. DIA.	MIN. COVER	WALL THICKNESS	MAX. HEIGHT OF COVER H (FT.)	
IN.				CORNER BEARING PRESSURE 2 TONS PER SQ. FT.	
17 x 13	15	12	0.060	3	-
21 x 15	18	12	0.060	3	8
24 x 18	21	12	0.060	3	8
28 x 20	24	15	0.075	3	7
32 x 24	30	18	0.075	3	5
42 x 29	36	21	0.075	3 1/2	5
49 x 33	42	24	0.105	4	5
57 x 38	48	24	0.105	5	5
64 x 43	54	24	0.105	4	6
71 x 47	60	24	0.164	3	6

2⅔IN. x ½IN. CORRUGATIONS
ALUMINUM PIPE ARCH Ø



INSTALLATION OF METAL OR PLASTIC PIPES



INSTALLATION OF MULTIPLE METAL OR PLASTIC PIPES

LEGEND

H = HEIGHT OF COVER (MIN. ALLOWABLE HEIGHT OF FILL OVER THE TOP OF THE PIPE, INCLUDING PAVEMENT THICKNESS)

■ = THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. MINIMUM COVER FOR FLEXIBLE PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT (MIN. OF PCCP).

L_1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 613 OR 624.

L_2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 611.

+ = MINIMUM SPACING BETWEEN OUTSIDE WALLS OF PIPE OR END SECTION.

Ø = PIPE HAVING ARTIFICIAL PERIMETER AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE REQUIRED IN PLANS WILL BE PERMITTED.

■ = PIPE HAVING 5 INCHES OR ABOVE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CANNOT BE USED WHEN COVER EXCEEDS 11 FT. USE ROUND PIPE.

Ø = COVER GREATER THAN 10 FT. SHALL BE USED ONLY AFTER FOREMAN INSPECTION OF FOUNDATION MATERIAL.

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Computer File Information	Sheet Revisions		
Division Date: 07/24/08 Initials: SJR	Date	Comments	
Last Modification Date: 07/24/08 Initials: TA			
Full Path: www.dot.state.co.us/CompSupport/			
Drawing File Name: M603D1.02.dwg			
DGN Ver: MicroStation V8 Scale: Not to Scale Units: English			

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METAL AND PLASTIC PIPE

STANDARD PLAN NO. M-603-1

Sheet No. 2 of 2

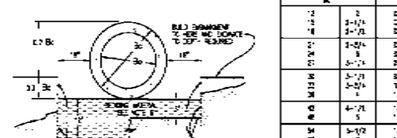
Issued by Project Development Branch on July 04, 2008

CIRCULAR (CR) | VERTICAL ELLIPTICAL (VE) | HORIZONTAL ELLIPTICAL (HE)

Δ PIPE SIZE-DIA. (INSIDE DIA.)	WALL THICKNESS	O.D. BELL OUTSIDE DIA.	SPAN	RISE	WALL THICKNESS	O.D. BELL OUTSIDE DIA.	SPAN	RISE	WALL THICKNESS	O.D. BELL OUTSIDE DIA.
IN.		FT.	IN.			FT.	IN.			FT.
12	2	0.13								
15	2-1/4	0.18								
18	2-1/2	0.20					22	14	2-3/4	0.49
21	2-5/8	0.25					26	16	2-3/4	0.56
24	3	0.29					29	18	2-3/4	0.62
27	3-1/4	0.34					32	20	2-3/4	0.72
30	3-1/2	0.37					36	22	3-1/4	0.78
36	3-1/2	0.37	25	42	4-1/2	1.02	43	25	4-1/2	0.99
42	4-1/2	0.58	29	50	5	1.20	50	29	5	1.13
48	5	0.65	32	57	5-1/2	1.39	58	33	5-1/2	1.33
54	5-1/2	0.72	43	65	6	1.56	58	43	6	1.38
60	6	0.80	46	73	6-1/2	1.75	73	48	6-1/2	1.53
66	6-1/2	0.87	51	80	7	1.92	80	53	7	1.68
72	7	0.95	54	91	7-1/2	2.08	87	58	7-1/2	1.82
78	7-1/2	1.02	62	98	8	2.25	88	62	8	1.98
84	8	1.10	68	106	8-1/2	2.38	106	68	8-1/2	2.13
90	8-1/2	1.18	73	113	9	2.56	115	72	9	2.25
96	9	1.25	77	121	9-1/2	2.75	121	77	9-1/2	2.43
102	9-1/2	1.32	82	128	9-3/4	2.85	125	82	9-3/4	2.54
108	10	1.39	87	135	10	2.96	136	87	10	2.68

Δ ALSO EQUIVALENT ROUND DIAMETER FOR ELLIPTICAL PIPE

DIMENSIONS FOR REINFORCED CONCRETE PIPE
(FOR INFORMATION ONLY)



NOTE: Bc IS THE OUTSIDE DIMENSION FOR CIRCULAR, SPAN OR RISE.

PIPE INSTALLATION
(WITH 0.7 PROJECTION RATIO)

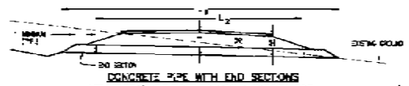
GENERAL NOTES

REINFORCED CONCRETE PIPE

1. MINIMUM COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE PIPE FROM DAMAGE. THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. THE MINIMUM COVER FOR REINFORCED CONCRETE PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT (MIN. OF PCCP).
2. FILL HEIGHTS GREATER THAN MAXIMUM ALLOWED IN THE TABLES OR FILL HEIGHTS OTHER THAN SHOWN ON THE SHEET REQUIRE SPECIAL DESIGN BY STRUCTURAL.
3. PIPE DESIGN IS BASED ON SAFETY FACTOR OF 1.25 ON ULTIMATE STRENGTH.
4. FILL HEIGHTS OF FILL OVER TOP OF PIPE ARE BASED ON UNIT WEIGHT OF SOIL OF 120 LBS. PER CUBIC FT.
5. PIPE CLASS IS DETERMINED FROM ASTM DESIGN CRITERIA.
6. BEDDING IS CLASS B (ACCEPTABLE FOR CONCRETE PIPE DESIGN MANUAL—AMERICAN CONCRETE PIPE ASSOCIATION) WITH SUPERIOR BEDDING FACTOR B = 1.9 (INCLUDING BED, BEDDING MATERIAL FOR BELL PIPE OR SOIL SHALL BE 2 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS I. BEDDING MATERIAL FOR BELL PIPE IN ROCK SHALL BE 13 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS I.
7. CHANGES IN DESIGN FACTORS REQUIRE CORRESPONDING CHANGES IN PIPE DESIGN.
8. MINIMUM WALL THICKNESS DIMENSIONS ARE BASED ON AASHTO M 170. SHALL BE FOR CIRCULAR PIPE, AND AASHTO M 206 FOR ELLIPTICAL PIPE.
9. BRACING FOR HANDLING PIPE INSTALLATIONS SHALL CONFORM TO THE DETAILS SHOWN ON STANDARD PLAN M-606-1.
10. WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL PIPE INSTALLATION SHALL BE USED.

NONREINFORCED CONCRETE PIPE

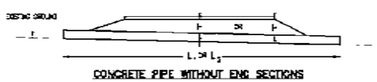
1. AT THE OPTION OF THE CONTRACTOR, NONREINFORCED CONCRETE PIPE, CONFORMING TO AASHTO M 86, MAY BE USED IN LIEU OF REINFORCED CONCRETE PIPE FOR ALL SIZES 36 INCHES IN DIAMETER AND SMALLER. THE NONREINFORCED CONCRETE PIPE SHALL MEET THE SAME D-LOAD TO PRODUCE THE ULTIMATE LOAD UNDER THE THREE-EDGE BEARING METHOD AS SPECIFIED FOR REINFORCED CONCRETE PIPE IN CONFORMANCE WITH AASHTO M 170. THE CONTRACTOR SHALL PROVIDE WRITTEN CERTIFICATION OF CONFORMANCE. THE WALL THICKNESS OF THE NONREINFORCED PIPE MAY BE INCREASED AS REQUIRED TO MEET D-LOAD REQUIREMENT.
2. ALL REQUIREMENTS FOR REINFORCED CONCRETE PIPE, EXCEPT THOSE RETAINED TO REINFORCEMENT, SHALL APPLY TO NONREINFORCED CONCRETE PIPE.



CONCRETE PIPE WITH END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

H = MAXIMUM HEIGHT OF FILL OVER TOP OF PIPE, INCLUDING PAVEMENT THICKNESS.
L_1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 612 OR 624.
L_2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 611.



CONCRETE PIPE WITHOUT END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

MINIMUM COVER FOR RIGID PIPE

TYPE OF PIPE	-DEPTH OF FILL OVER TOP OF PIPE, H (FEET)				
	CLASS OF PIPE		CLASS IV, SPACER 3-1/2		
	CLASS CR I, CLASS VE I, CLASS HE I, CLASS CR II, CLASS VE II, CLASS HE II	CLASS CR III, CLASS VE III, CLASS HE III	CLASS CR IV, CLASS VE IV, CLASS HE IV	CLASS CR V, CLASS VE V	CLASS VE VI
	1200 D	1350 D	2000 D	3000 D	4000 D
CIRCULAR (CR)	MIN. TO 18	MIN. TO 25	± 25 TO 31	± 31 TO 45	
VERTICAL ELLIPTICAL (VE)	MIN. TO 18	MIN. TO 25	± 25 TO 31	± 31 TO 45	
HORIZONTAL ELLIPTICAL (HE)	MIN. TO 18	MIN. TO 25	± 25 TO 31		± 45 TO 60

ALLOWABLE RANGE OF HEIGHTS FOR FILL OVER REINFORCED CONCRETE PIPE
(ALL SIZES)

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Computer File Information	Sheet Revisions		
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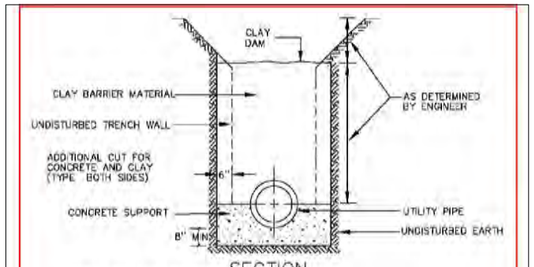
REINFORCED CONCRETE PIPE

STANDARD PLAN NO. M-603-2

Sheet No. 1 of 1

Issued by Project Development Branch on July 04, 2008



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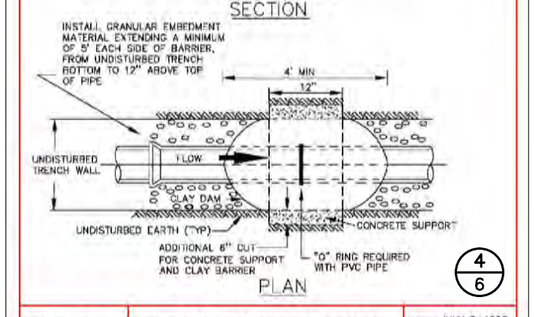


PLAN

4/6

DRAWN BY: JSH
CHECKED BY: RJH
APPROVED BY: DIRECTOR OF PUBLIC WORKS

CITY OF BOULDER, COLORADO

GROUND WATER BARRIER

ISSUED: JULY 2, 1998
REVISED: OCT. 17, 2000

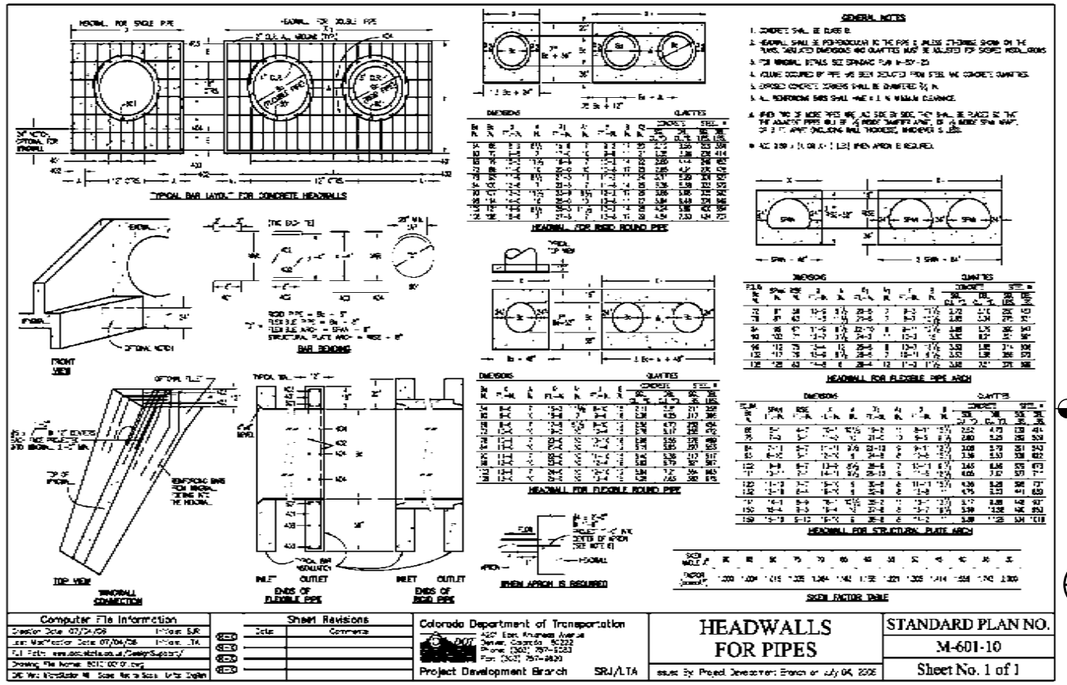
DRAWING NO. 4.08

NOT FOR CONSTRUCTION
PERMIT REVIEW ISSUE

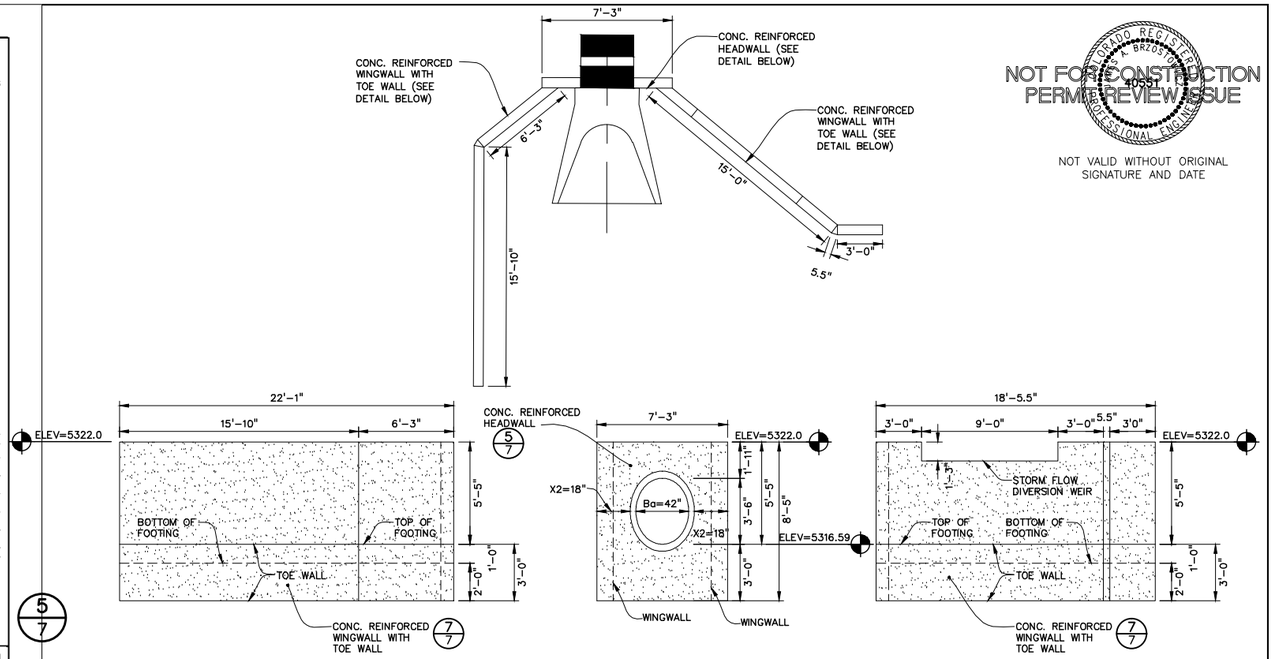
COLORADO REGISTERED PROFESSIONAL ENGINEER JAMES BRZOSTOWICZ 40537

NOT VALID WITHOUT ORIGINAL SIGNATURE AND DATE

PREPARED BY:	PREPARED FOR:	PROJECT INFO:	DESIGNED BY: LRE	REVISION DESCRIPTIONS	DATE	DRAWING INFO.	DATE: 22 OCT 2008	JOB NO: E-5495.1	SHEET 6
Drexel, Barrell & Co. Engineers • Surveyors (303) 442-4338	BCC, LLC	CONSTRUCTION PLANS FOR	DRAWN BY: LRE			DETAILS	SCALE: H: NONE V: NONE	DRAWING NO.: 6D 324	SHEETS 9
1800 38TH STREET BOULDER, COLORADO 80301	1526 SPRUCE STREET, SUITE 260	DRY CREEK DITCH NO.2	CHECKED BY:						
COLORADO SPRINGS (719) 260-0887 • GREELEY (970) 351-0645 • STEAMBOAT SPRINGS (970) 879-1523 • GRAND JUNCTION (970) 257-1350	BOULDER, COLORADO 80302	PIPING AND REALIGNMENT							
CONTACT: JAMES BRZOSTOWICZ, P.E.	(303) 949-1322	5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD							
	CONTACT: MICHAEL BOYERS	UNINCORPORATED BOULDER COUNTY, COLORADO							



5/7



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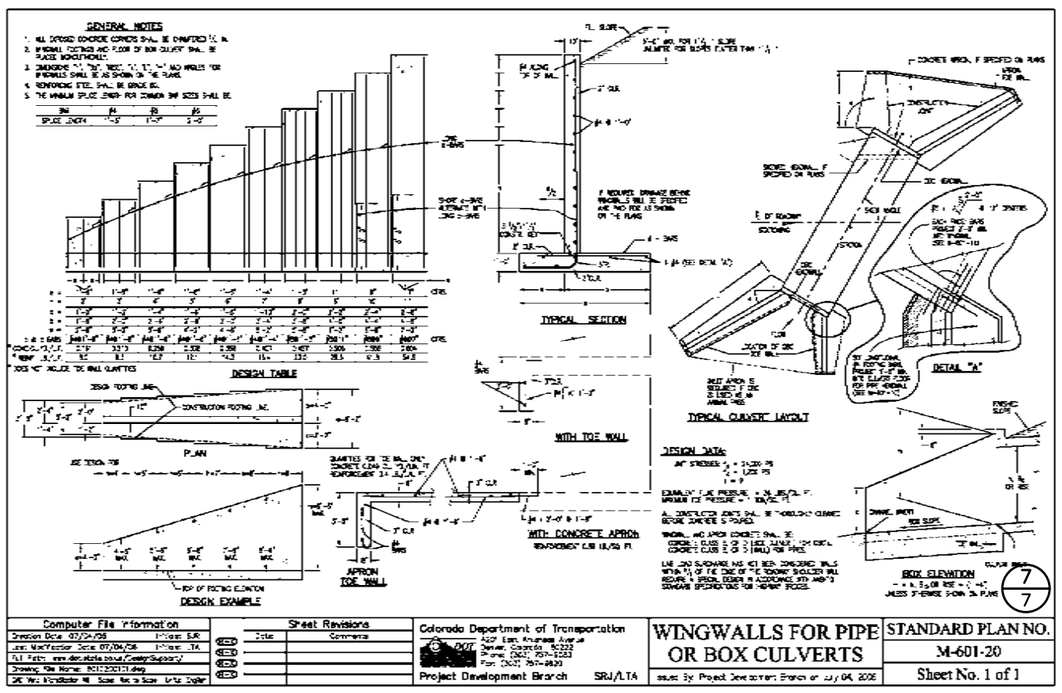
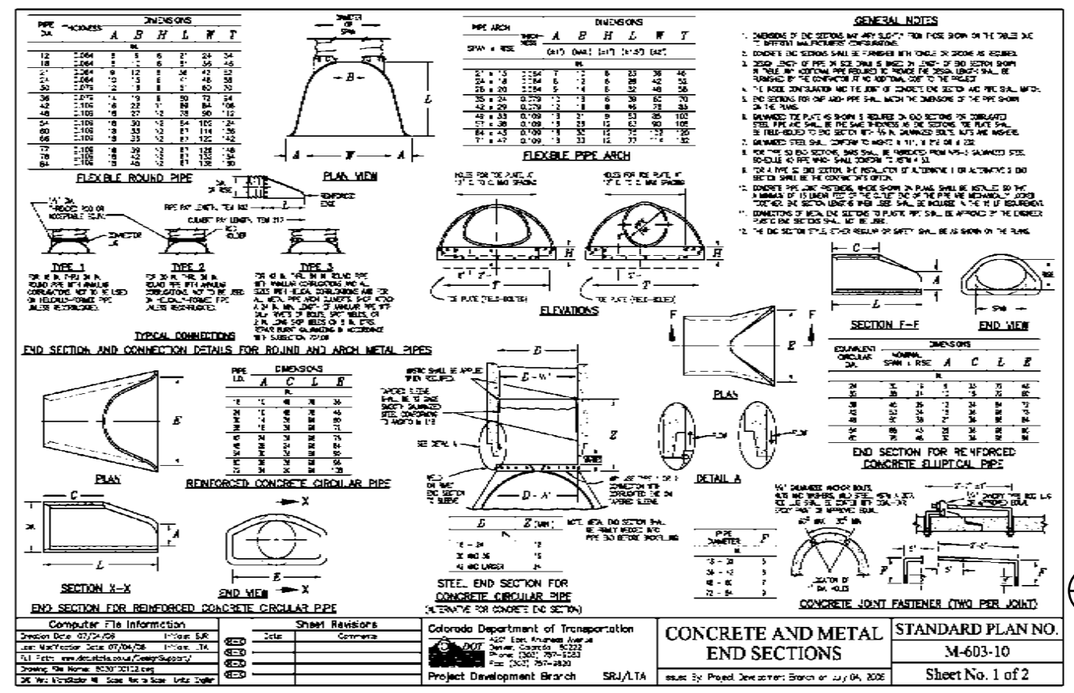
6/7 DRY CREEK DITCH NO. 2 HEADWALL DETAIL

NOT TO SCALE



7/7



8/7

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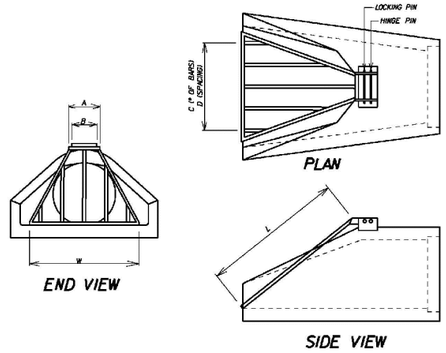
PREPARED BY: Drexel, Barrell & Co. Engineers • Surveyors 1800 38TH STREET BOULDER, COLORADO 80301 (303) 442-4338 COLORADO SPRINGS (719) 260-0887 • GREELEY (970) 351-0645 • STEAMBOAT SPRINGS (970) 879-1523 • GRAND JUNCTION (970) 257-1350 CONTACT: JAMES BRZOSTOWICZ, P.E.	PREPARED FOR: BCC, LLC 1526 SPRUCE STREET, SUITE 260 BOULDER, COLORADO 80302 (303) 949-1322 CONTACT: MICHAEL BOYERS	PROJECT INFO: CONSTRUCTION PLANS FOR DRY CREEK DITCH NO.2 PIPING AND REALIGNMENT 5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD UNINCORPORATED BOULDER COUNTY, COLORADO	DESIGNED BY: LRE DRAWN BY: LRE CHECKED BY: REVISION DESCRIPTIONS DATE

DRAWING INFO.: DETAILS

DATE:	JOB NO:	SHEET
22 OCT 2008	E-5495.1	7
SCALE: H: NONE V: NONE	DRAWING NO.: 6D 324	SHEETS 9



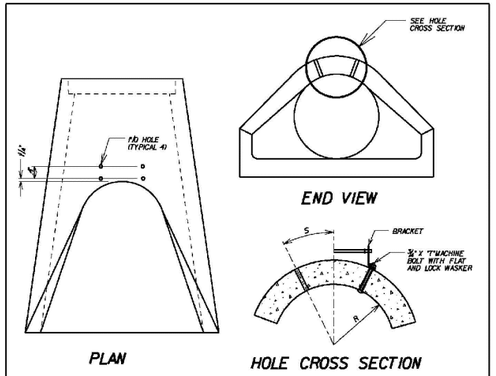
PIPE DIAMETER	A	B	C	D	W	L
12"	11"	7.5"	3	6"	27"	30"
15"	9"	5.5"	3	6.5"	27"	28"
18"	10"	6.5"	3	8"	28"	31"
24"	12"	9.5"	5	8"	40"	47.5"
30"	15"	12.5"	5	9"	52"	59.75"
36"	18"	15.5"	7	8.5"	58"	71.25"
42"	21"	18.5"	7	9"	64"	75"
48"	24"	21.5"	9	8"	70"	82.75"
54"	24"	21"	14	6"	84"	84"
60"	24"	21"	22	6"	132"	108"
72"	24"	21"	22	6"	132"	108"

9/8

PUBLIC WORKS DIVISION

STORM DRAINAGE
FLARED END SECTION TRASH RACK
(CIRCULAR PIPE)
DETAIL 300-06C

DATE: FEB., 2001 SCALE: NOT TO SCALE



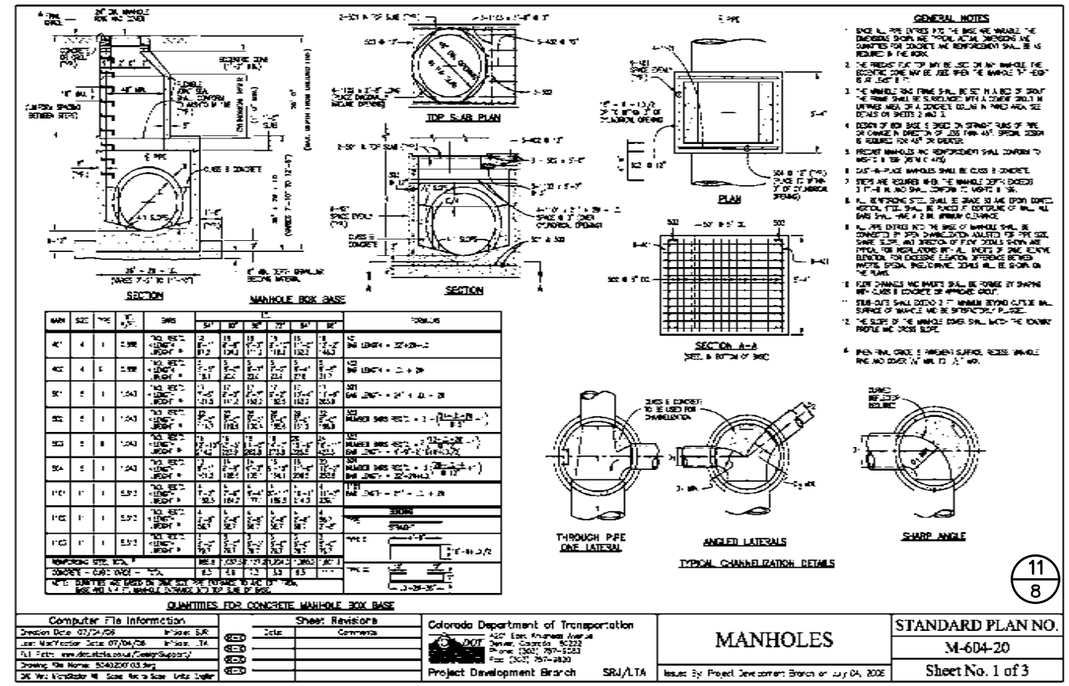
PIPE DIAMETER	R	S	T
12"	6"	5.25"	4.5"
15"	9.75"	3.5"	4.75"
18"	11.5"	5"	5"
24"	15"	6.5"	5.5"
30"	18.5"	8"	6"
36"	22"	9.5"	6.5"
42"	25.5"	11"	7"
48"	29"	12.75"	7.5"
54"	33.25"	14.5"	8.5"
60"	36.75"	16.25"	9"
72"	43.75"	19.75"	8"

10/8

PUBLIC WORKS DIVISION

STORM DRAINAGE
TRASH RACK MOUNTING DETAIL
(CIRCULAR FLARED END SECTION)
DETAIL 300-06D

DATE: FEB., 2001 SCALE: NOT TO SCALE



11/8

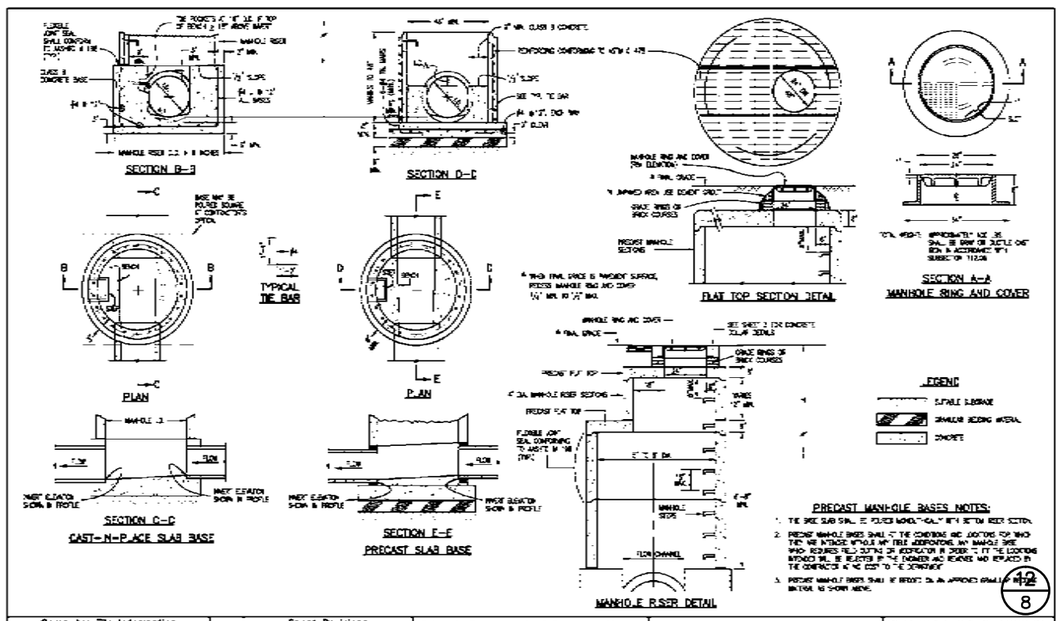
Computer File Information	Sheet Revisions		
Division Date 07/24/08 Initials SJR		Date	Comments
Last Modification Date 07/24/08 Initials TA			
Full Path: www.dot.state.co.us/CamlySupport/			
Drawing File Name: S0402X003.dwg			
DGN Ver: MicroStation V8 Scale: Not to Scale Units: English			

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757-9283
Fax: (303) 757-2820
Project Development Branch SRJ/LTA

MANHOLES

STANDARD PLAN NO.
M-604-20
Sheet No. 1 of 3

Issued by: Project Development Branch on July 04, 2008



12/8

Computer File Information	Sheet Revisions		
Division Date 07/24/08 Initials SJR		Date	Comments
Last Modification Date 07/24/08 Initials TA			
Full Path: www.dot.state.co.us/CamlySupport/			
Drawing File Name: S0402X003.dwg			
DGN Ver: MicroStation V8 Scale: Not to Scale Units: English			

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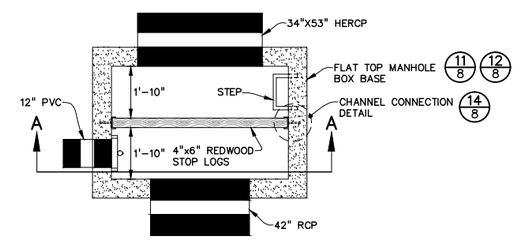
Project Development Branch SRJ/LTA

MANHOLES

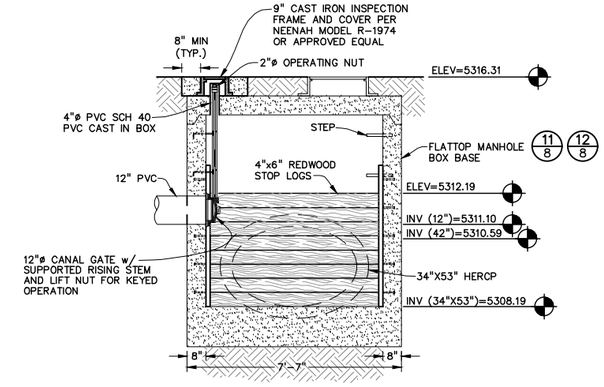
STANDARD PLAN NO.
M-604-20
Sheet No. 2 of 3

Issued by: Project Development Branch on July 04, 2008



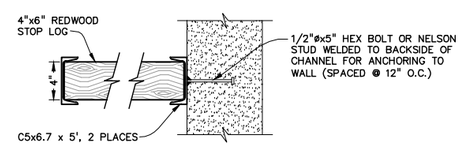
13/8 WEIR DETAIL PLAN VIEW

NOT TO SCALE



SECTION A–A

NOT TO SCALE



14/8 CHANNEL CONNECTION DETAIL

NOT TO SCALE

NOT FOR CONSTRUCTION
PERMIT REVIEW ISSUE

COLORADO REGISTERED PROFESSIONAL ENGINEER J. BRZOSTOWICZ 40553

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PREPARED BY: Drexel, Barrell & Co. Engineers • Surveyors
1800 38TH STREET BOULDER, COLORADO 80301 (303) 442-4338
COLORADO SPRINGS (719) 260-0887 • GREELEY (970) 351-0645 • STEAMBOAT SPRINGS (970) 879-1523 • GRAND JUNCTION (970) 257-1350
CONTACT: JAMES BRZOSTOWICZ, P.E.

PREPARED FOR: BCC, LLC
1526 SPRUCE STREET, SUITE 260
BOULDER, COLORADO 80302
(303) 949-1322
CONTACT: MICHAEL BOYERS

PROJECT INFO: CONSTRUCTION PLANS FOR
DRY CREEK DITCH NO.2
PIPING AND REALIGNMENT
5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD
UNINCORPORATED BOULDER COUNTY, COLORADO

DESIGNED BY: LRE
DRAWN BY: LRE
CHECKED BY:

REVISION DESCRIPTIONS DATE

DRAWING INFO.

DETAILS

DATE:	JOB NO:	SHEET
22 OCT 2008	E-5495.1	8
SCALE: H: NONE V: NONE	DRAWING NO.: 6D 324	SHEETS 9

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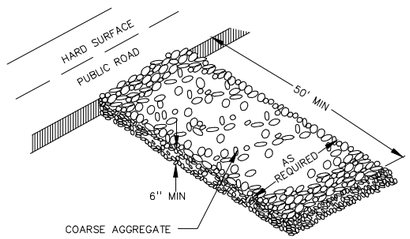
DEFINITION

A STONE STABILIZED PAD LOCATED AT POINTS OF VEHICULAR INGRESS AND EGRESS ON A CONSTRUCTION SITE

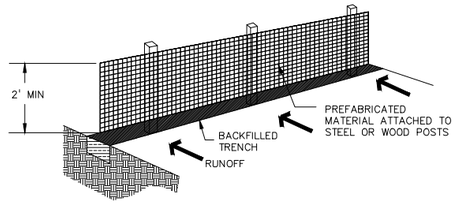
PURPOSE

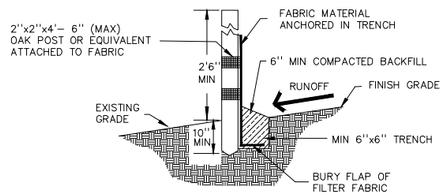
TO REDUCE THE AMOUNT OF MUD TRANSPORTED ONTO PUBLIC ROADS BY MOTOR VEHICLES OR RUNOFF



13/9

DRAWN BY: JSH CHECKED BY: RJH APPROVED BY: DIRECTOR OF PUBLIC WORKS	CITY OF BOULDER, COLORADO TEMPORARY GRAVEL CONSTRUCTION ENTRANCE (VTC)	ISSUED: JULY 2, 1998 REVISED: OCT. 17, 2000 DRAWING NO. 7.30





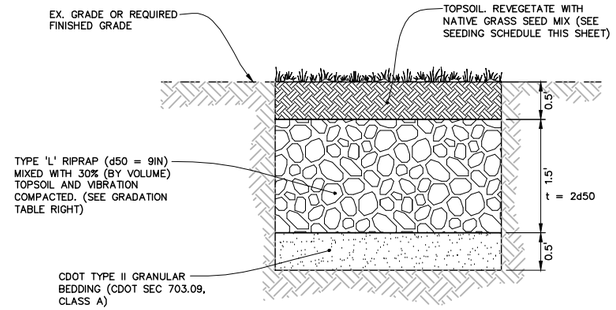
DETAIL

NOTES:

1. SILT FENCE SHALL BE INSTALLED BEFORE ANY EARTH REMOVAL OR EXCAVATION TAKES PLACE.
2. SET POSTS MAXIMUM 8 FEET ON CENTER AND EXCAVATE 6"x6" TRENCH UPSLOPE ALONG THE LINE OF POSTS.
3. ATTACH FILTER FABRIC TO POSTS AND EXTEND IT INTO TRENCH.
4. BACKFILL AND COMPACT EXCAVATED SOIL.

14/9

DRAWN BY: JSH CHECKED BY: RJH APPROVED BY: DIRECTOR OF PUBLIC WORKS	CITY OF BOULDER, COLORADO PREFABRICATED SILT FENCE INSTALLATION	ISSUED: JULY 2, 1998 REVISED: OCT. 17, 2000 DRAWING NO. 7.26 (SF)



CLASSIFICATION AND GRADATION OF OUTLET PROTECTION RIPRAP

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSIONS (INCHES)	d50 * (INCHES)
TYPE 'L'	70–100 50–70 35–50 2–10	15 12 9 3	9

* d50 MEAN PARTICLE SIZE

RIPRAP GRADATION LIMITS: $\frac{dMAX}{d50} = 1.25$

$\frac{d50}{d10-d20} = 2-3$

NOTES:
1. RIPRAP LIMITS SHALL BE A MINIMUM OF 10.5–FT AS MEASURED DOWNSTREAM FROM THE END OF THE F.E.S. AND SHALL BE EXTENDED 2–FT VERTICALLY UP THE CHANNEL SIDE SLOPES AS GENERALLY SHOWN ON SHEET 3.

2. t = 3.0–FT OF OUTLET PROTECTION AS MEASURED UPSTREAM FROM THE DOWNSTREAM LIMITS OF PROTECTION.

16/9 TYPE 'L' RIPRAP OUTLET PROTECTION

NOT TO SCALE

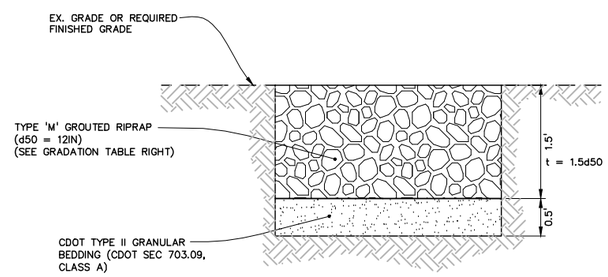
TREVARTON ROADSIDE GRASS SEED MIX: (TS)/(PS)

COMMON NAME	SCIENTIFIC NAME	VARIETY	% OF MIX	KG PLS / HA	LB PLS / ACRE
BIG BLUE STEM	ANDROPOGON GERARDII	PAWNEE	10	1.2	6.5
BLUE GAMMA	BOUTELOUA GRACILIS	HACHITA OR LOVINGTON	25	0.6	3.3
SIDE OATS GAMMA	BOUTELOUA CURTIPENDULA	VAUGHN	25	2.6	14.2
CANADIAN WILDRYE	ELYMUS CANADENSIS	NATIVE	10	1.7	9.3
SLENDER WHEATGRASS	ELYMUS TRACHYCAULUS	SAN LUIS	10	5.4	29.4
WESTERN WHEATGRASS	PASCROPYRUM SMITHII	ARRIBA	20	15.5	84.5
		TOTAL =	100%	27.0	147.2

NOTES:

1. KG PLS / HA = KILOGRAMS OF PURE LIVE SEED PER HECTARE.
2. LB PLS / ACRE = POUNDS OF PURE LIVE SEED PER ACRE.
3. ORDERS WILL BE MADE IN PURE LIVE SEED POUNDS, NOT BULK POUNDS.
4. RATES SHOWN IN THE ABOVE TABLE ARE FOR DRILL SEEDING.
5. RATES SHOWN IN THE ABOVE TABLE NEED TO BE DOUBLED IF A BROADCAST SEEDING METHOD IS USED.
6. THE USE OF ANY OTHER SEED MIX MUST BE APPROVED BY BOULDER COUNTY

15/9



CLASSIFICATION AND GRADATION OF GROUTED RIPRAP

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSIONS (INCHES)	d50 * (INCHES)
TYPE 'M'	70–100 50–70 35–50 2–10	21 18 12 4	12

* d50 MEAN PARTICLE SIZE

RIPRAP GRADATION LIMITS: $\frac{dMAX}{d50} = 1.25$

$\frac{d50}{d10-d20} = 2-3$

NOTES:
1. GROUTED RIPRAP LIMITS SHALL BE AS GENERALLY SHOWN ON SHEET 4.

2. CONCRETE MORTAR FOR GROUTED RIPRAP SLOPE SHALL MEET THE REQUIREMENTS OF CDOT SEC. 507.05 "GROUTED RIPRAP SLOPE AND DITCH PAVING".

3. 2:1 MAXIMUM ARMORING SIDE SLOPES.

17/9 GROUTED TYPE 'M' RIPRAP SLOPE ARMORING

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DATE:	JOB NO:	SHEET
22 OCT 2008	E–5495.1	9
SCALE: H: NONE V: NONE	DRAWING NO.: 6D 324	SHEETS 9

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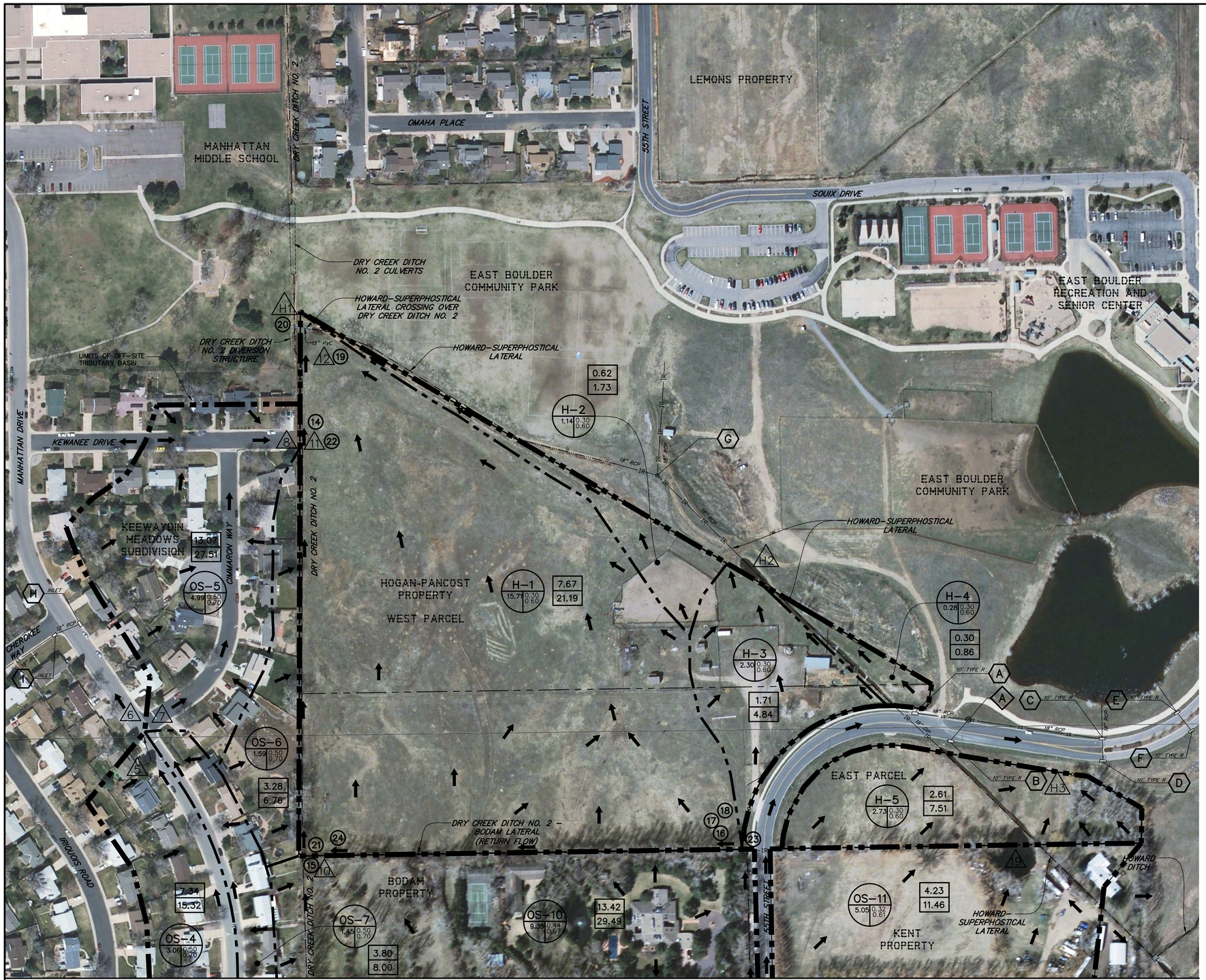

N

100 50 0 100 200
SCALE: 1"=100'

LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE SUB-BASIN BOUNDARY
- DRAINAGE BASIN DESIGN POINT (S)
- 10 YEAR EXISTING FLOW (cfs)
- 100 YEAR EXISTING FLOW (cfs)
- BASIN I.D.
- BASIN AREA (Acres)
- 10 YEAR RUNOFF COEFFICIENT
- 100 YEAR RUNOFF COEFFICIENT
- DIRECTION OF FLOW
- MANHOLE (A)
- WEIR (C)
- INLET (C)
- PHOTO I.D. (X)

C-3 3.45 .45 .90

REFER TO SHEET DR-2 FOR STORM DRAINAGE ROUTING SCHEMATIC.

PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
1800 38TH STREET
BOULDER, COLORADO 80301
CONTACT: JAMES BRZOSTOWICZ, P.E.
(303) 442-4338
BOULDER•COLORADO SPRINGS
DENVER•GRAND JUNCTION
GREELEY•STEAMBOAT SPRINGS

OWNER/DEVELOPER:

BCC, LLC
1526 SPRUCE STREET, SUITE 260
BOULDER, COLORADO 80302
(303) 949-1322
CONTACT: MICHAEL BOYERS

CONCEPTUAL STORM WATER AND FLOODPLAIN MITIGATION REPORT FOR:

HOGAN-PANCOST PROPERTY

5399 KEWANEE DR & 5697 SOUTH BOULDER RD
BOULDER COUNTY, COLORADO

ISSUE	DATE
REPORT ISSUE	01/30/09
REPORT ISSUE	05/01/10

DESIGNED BY:	LRE
DRAWN BY:	MLM
CHECKED BY:	
FILE NAME:	54951DR01

COLORADO REGISTERED PROFESSIONAL ENGINEER JAMES BRZOSTOWICZ 40551

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DRAWING SCALE:
HORIZONTAL: 1" = 100"
VERTICAL:

EXISTING CONDITIONS DRAINAGE EXHIBIT

PROJECT NO.	5495.1
DRAWING NO.	FILE

DR-1

SHEET: 1 OF 3

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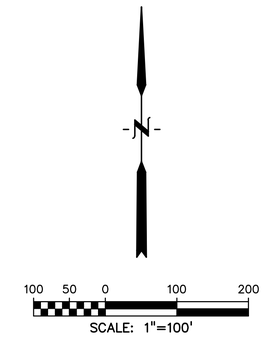
SEE SHEET DR-1
MATCH LINE



LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE SUB-BASIN BOUNDARY
- DRAINAGE BASIN DESIGN POINT (5)
- 10 YEAR EXISTING FLOW (cfs)
- 100 YEAR EXISTING FLOW (cfs)
- BASIN I.D. (C-3)
- BASIN AREA (Acres) (3.45)
- 10 YEAR RUNOFF COEFFICIENT (.45)
- 100 YEAR RUNOFF COEFFICIENT (.90)
- DIRECTION OF FLOW
- MANHOLE (A)
- WEIR (C)
- INLET (C)
- PHOTO I.D. (X)

EXISTING CONDITIONS RUNOFF SUMMARY DRY CREEK DITCH NO.2 OPEN CHANNEL

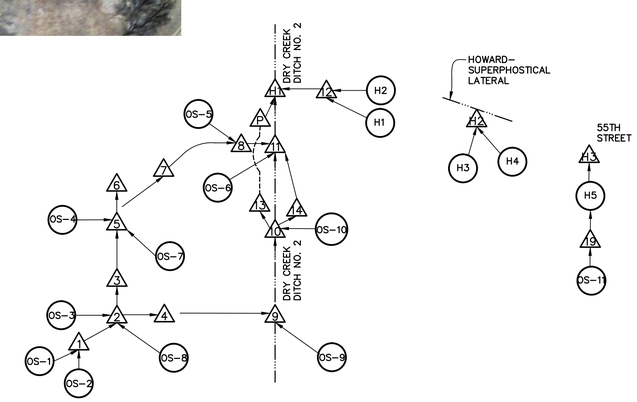
DESIGN POINT	RUNOFF 10 YR (cfs)	RUNOFF 100 YR (cfs)
DP1	41.55	69.65
DP2	40.41	65.57
DP3	20.20	32.78
DP4	20.20	32.78
DP5	20.24	34.72
DP6	10.12	17.36
DP7	10.12	17.36
DP8	17.33	34.67
DP9	28.57	52.44
DP10	38.90	78.93
DP11	49.48	95.55
DP12	8.213	22.70
DP19	4.23	11.46
DPH-1	52.25	103.58
DPH-2	1.84	5.21
DPH-3	2.91	8.09

EXISTING CONDITIONS RUNOFF SUMMARY DRY CREEK DITCH NO.2 PIPED

DESIGN POINT	RUNOFF 10 YR (cfs)	RUNOFF 100 YR (cfs)
DP1	41.55	69.65
DP2	40.41	65.57
DP3	20.20	32.78
DP4	20.20	32.78
DP5	20.24	34.72
DP6	10.12	17.36
DP7	10.12	17.36
DP8	17.33	34.67
DP9	28.57	52.44
DP10	38.90	78.93
DP11	19.45	48.65
DP12	8.21	22.70
DP13	38.90	46.00
DP14	0.004	32.93
DP19	4.23	11.46
DPP	37.32	45.99
DPH-1	53.06	102.44
DPH-2	1.84	5.21
DPH-3	2.91	8.09

DEVELOPED CONDITIONS RUNOFF SUMMARY

DESIGN POINT	DEVELOPED 10 YR (cfs)	DEVELOPED 100 YR IRR=25 (cfs)
DP1	41.55	69.65
DP2	40.41	65.57
DP3	20.20	32.78
DP4	20.20	32.78
DP5	20.24	34.72
DP6	10.12	17.36
DP7	10.12	17.36
DP8	17.33	34.67
DP9	28.57	52.44
DP10	38.90	78.93
DP11	21.86	44.12
DP12	8.13	40.20
DP13	38.90	46.00
DP14	0.004	32.93
DP16	0	20.38
DP17	26.43	54.07
DP18	8.13	40.20
DP19	4.23	11.46
DPP	37.32	45.99
DPH-1	43.33	81.60
DPH-2	0.297	0.86
DPH-3	2.909	8.11



EXISTING CONDITIONS
STORM DRAINAGE ROUTING SCHEMATIC
NOT TO SCALE

PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
1800 38TH STREET
BOULDER, COLORADO 80301
CONTACT: JAMES BRZOSTOWICZ, P.E.
(303) 442-4338
BOULDER•COLORADO SPRINGS
DENVER•GRAND JUNCTION
GREELEY•STEAMBOAT SPRINGS

OWNER/DEVELOPER:

BCC, LLC
1526 SPRUCE STREET, SUITE 260
BOULDER, COLORADO 80302
(303) 949-1322
CONTACT: MICHAEL BOYERS

CONCEPTUAL STORM WATER AND FLOODPLAIN MITIGATION REPORT FOR:
HOGAN-PANCOST PROPERTY
5399 KEWANEE DR & 5697 SOUTH BOULDER RD
BOULDER COUNTY, COLORADO

ISSUE	DATE
REPORT ISSUE	01/30/09
REPORT ISSUE	05/01/10

DESIGNED BY:	LRE
DRAWN BY:	MLM
CHECKED BY:	
FILE NAME:	54951DR01

COLORADO REGISTERED PROFESSIONAL ENGINEER JAMES A. BRZOSTOWICZ 40551

NOT VALID WITHOUT ORIGINAL SIGNATURE AND DATE

DRAWING SCALE:
HORIZONTAL: 1" = 60"
VERTICAL: 1" = 60"

EXISTING CONDITIONS DRAINAGE EXHIBIT

PROJECT NO.	5495.1
DRAWING NO.	FILE

DR-2

SHEET: 2 OF 3

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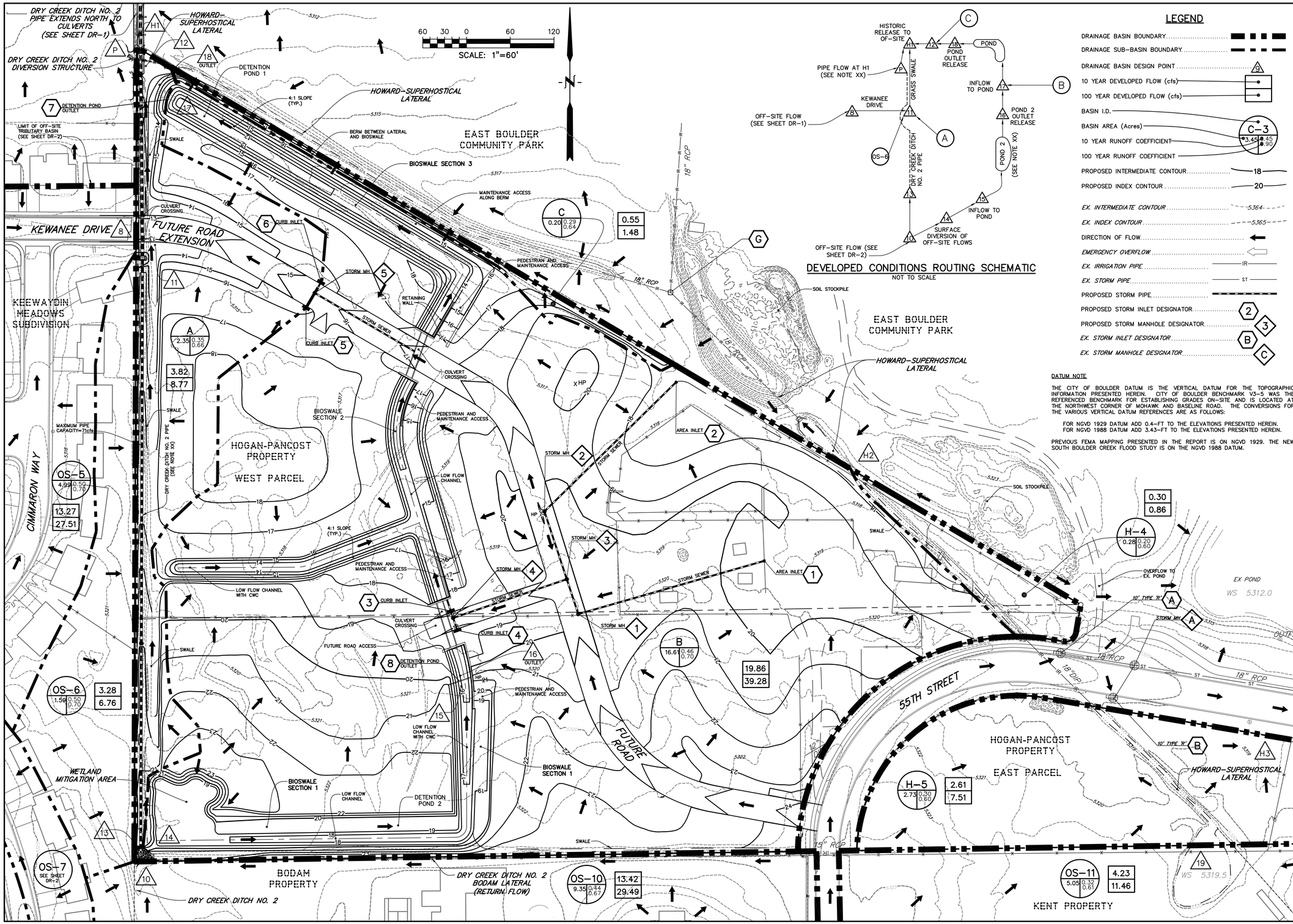

LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE SUB-BASIN BOUNDARY
- DRAINAGE BASIN DESIGN POINT
- 10 YEAR DEVELOPED FLOW (cfs)
- 100 YEAR DEVELOPED FLOW (cfs)
- BASIN I.D.
- BASIN AREA (Acres)
- 10 YEAR RUNOFF COEFFICIENT
- 100 YEAR RUNOFF COEFFICIENT
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- EX. INTERMEDIATE CONTOUR
- EX. INDEX CONTOUR
- DIRECTION OF FLOW
- EMERGENCY OVERFLOW
- EX. IRRIGATION PIPE
- EX. STORM PIPE
- PROPOSED STORM PIPE
- PROPOSED STORM INLET DESIGNATOR
- PROPOSED STORM MANHOLE DESIGNATOR
- EX. STORM INLET DESIGNATOR
- EX. STORM MANHOLE DESIGNATOR

DATUM NOTE

THE CITY OF BOULDER DATUM IS THE VERTICAL DATUM FOR THE TOPOGRAPHIC INFORMATION PRESENTED HEREIN. CITY OF BOULDER BENCHMARK V3-5 WAS THE REFERENCED BENCHMARK FOR ESTABLISHING GRADES ON-SITE AND IS LOCATED AT THE NORTHWEST CORNER OF MOHAWK AND BASELINE ROAD. THE CONVERSIONS FOR THE VARIOUS VERTICAL DATUM REFERENCES ARE AS FOLLOWS:

FOR NGVD 1929 DATUM ADD 0.4-FT TO THE ELEVATIONS PRESENTED HEREIN.
FOR NGVD 1988 DATUM ADD 3.43-FT TO THE ELEVATIONS PRESENTED HEREIN.

PREVIOUS FEMA MAPPING PRESENTED IN THE REPORT IS ON NGVD 1929. THE NEW SOUTH BOULDER CREEK FLOOD STUDY IS ON THE NGVD 1988 DATUM.

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ISSUE	DATE
REPORT ISSUE	01/30/09
REPORT ISSUE	05/01/10
ADDED DATUM NOTE	10/28/10

DESIGNED BY:	LRE
DRAWN BY:	MLM
CHECKED BY:	
FILE NAME:	54951DR02

COLORADO REGISTERED PROFESSIONAL ENGINEER JAMES BRZOSTOWICZ 40551

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DRAWING SCALE:
HORIZONTAL: 1"=60'
VERTICAL: 1"=60'

PROPOSED CONDITIONS DRAINAGE EXHIBIT

PROJECT NO.	5495.1
DRAWING NO.	FILE

DR-3

SHEET: 3 OF 3