

**UNDERGROUND**

- WORK UNDER THIS SECTION SHALL INCLUDE TRENCHING, INSTALLATION OF PIPE, CASTINGS, STRUCTURES, BACKFILLING OF TRENCHES & COMPACTION, AND TESTING AS SHOWN ON THE CONSTRUCTION PLANS. FITTINGS AND ACCESSORIES NECESSARY TO COMPLETE THE WORK MAY NOT BE SPECIFIED BUT SHALL BE CONSIDERED AS INCIDENTAL TO THE COST OF THE CONTRACT.
- ALL UTILITY TRENCHES BENEATH PROPOSED OR EXISTING UTILITIES, PROPOSED OR EXISTING PAVEMENT, DRIVEWAYS, SIDEWALKS AND FOR A DISTANCE OF TWO FEET ON EITHER SIDE OF SAME, AND/OR WHEREVER ELSE SHOWN ON THE CONSTRUCTION PLAN SHALL BE BACKFILLED WITH IDOT APPROVED GRANULAR CA-6, GRADE 7, 8, OR 9 COMPACTED TO 90% OF MODIFIED PROCTOR DENSITY.
- "BAND-SEAL" OR SIMILAR FLEXIBLE TYPE COUPLINGS SHALL BE USED WHEN CONNECTING SEWER PIPES OF DISSIMILAR MATERIALS. WHEN CONNECTING TO AN EXISTING SEWER MAIN BY MEANS OTHER THAN AN EXISTING WYE, TEE, OR AN EXISTING MANHOLE, ONE OF THE FOLLOWING METHODS SHALL BE USED:
  - CIRCULAR SAW-CUT OF SEWER MAIN BY PROPER TOOLS ("SEWER TAP" MACHINE OR SIMILAR) AND PROPER INSTALLATION OF HUB-WYE SADDLE OR HUB-TEE SADDLE.
  - REMOVE AN ENTIRE SECTION OF PIPE (BREAKING ONLY THE TOP OF ONE BELL) AND REPLACE WITH A WYE OR TEE BRANCH SECTION.
  - WITH THE PIPE CUTTER, NEATLY AND ACCURATELY CUT OUT DESIRED LENGTH OF PIPE FOR INSERTION OF PROPER FITTING, USING "BAND-SEAL" OR SIMILAR COUPLINGS TO HOLD IT FIRMLY IN PLACE.
- ALL FLOOR DRAINS AND FLOOR DRAIN SUMP PUMPS SHALL DISCHARGE INTO THE SANITARY SEWER.
- ALL DOWNSPOUTS, FOOTING DRAINS AND SUBSURFACE STORM WATERS SHALL DISCHARGE INTO THE STORM SEWER OR ONTO THE GROUND.
- SANITARY SEWERS SHALL BE CONSTRUCTED OF POLYVINYL CHLORIDE PLASTIC GRAVITY SEWER PIPE (PVC) CONFORMING TO ASTM D-3034 WITH AN SDR OF 26 WITH ELASTOMERIC GASKET JOINTS CONFORMING TO BOTH ASTM D-1869 AND ASTM D-3212.
- ALL SANITARY SEWER MANHOLES SHALL HAVE ECCENTRIC CONES. CONE OPENINGS SHALL BE CENTERED PERPENDICULAR TO THE MAINLINE FLOW. ALL STRUCTURE SECTIONS AND ADJUSTING RINGS SHALL BE SECURELY SEALED TO EACH OTHER OR TO THE CONE SECTION OR TOP BARREL SECTION OF THE MANHOLE USING RESILIENT, FLEXIBLE, NON-HARDENING, PREFORMED BITUMINOUS MASTIC (RAM-BLOCK OR APPROVED EQUAL). THIS MASTIC SHALL BE APPLIED IN SUCH A MANNER THAT NO SURFACE WATER OR GROUND WATER INFLOW CAN ENTER THE MANHOLE THROUGH GAPS BETWEEN BARREL SECTIONS OR CONE SECTIONS AND ADJUSTING RINGS. SANITARY SEWER MANHOLES SHALL BE 4" HARDENING, PREFORMED BITUMINOUS MASTIC (RAM-BLOCK OR APPROVED EQUAL). THIS MASTIC SHALL BE APPLIED IN SUCH A MANNER THAT NO SURFACE WATER OR GROUND WATER INFLOW CAN ENTER THE MANHOLE THROUGH GAPS BETWEEN BARREL SECTIONS OR CONE SECTIONS AND ADJUSTING RINGS. SANITARY SEWER MANHOLES SHALL BE 4" DIAMETER PRECAST STRUCTURES, WITH APPROPRIATE FRAME AND LIDS (SEE CONSTRUCTION STANDARDS SHEET). LIDS SHALL BE IMPRINTED "SANITARY SEWER".
- SANITARY SERVICES SHALL BE LAID TO A MINIMUM GRADE OF 1.00% THE END OF EACH SERVICE SHALL BE SEALED WITH A MANUFACTURER'S WATERTIGHT PLUG. SANITARY SERVICE STUBS SHALL BE MARKED IN ACCORDANCE WITH THESE CONSTRUCTION NOTES. SANITARY SEWER SERVICES SHALL BE A MINIMUM OF 6" IN DIAMETER AND THE SAME MATERIAL AS THE MAIN SEWER IF 10 FEET SEPARATION IS MAINTAINED, OTHERWISE SERVICE SHALL BE SCHEDULE 40 PVC WITH SOLVENT WELD JOINTS.
- SEWER SERVICE RISER SHALL BE USED WHEN MAINLINE SEWER EXCEEDS 12 FT. IN DEPTH.
- UNLESS OTHERWISE INDICATED ON THE PLANS, STORM SEWER PIPE SHALL BE REINFORCED CONCRETE CULVERT PIPE OF THE CLASS AS INDICATED ON THE PLANS, AND CONFORMING TO ASTM C-76. JOINTS SHALL TYPICALLY BE A "TOWEL APPLIED" BITUMINOUS MASTIC COMPOUND IN ACCORDANCE WITH ASTM C-76 (OR C-14 AS MAY BE APPLICABLE OR RUBBER "O"-RING GASKET JOINTS CONFORMING TO ASTM C-443). LOCATIONS WHERE THE STORM SEWER CROSSES WATER MAINS AN "O"-RING JOINT IN ACCORDANCE WITH ASTM C-361 SHALL BE USED.
- STORM SEWER MANHOLES SHALL BE PRECAST STRUCTURES, WITH THE DIAMETER DEPENDENT ON THE PIPE SIZE AND WITH APPROPRIATE FRAME AND LIDS (SEE CONSTRUCTION STANDARDS). LIDS SHALL BE IMPRINTED "STORM SEWER".
- ALL SANITARY SEWER AND SEWER SERVICES SHALL BE INSTALLED ON GRANULAR CRUSHED STONE BEDDING CLASS 1, (IDOT GRADATION CA-11 CONFORMING TO ASTM D-2321, WITH A MINIMUM THICKNESS EQUAL TO 1/4 OF THE OUTSIDE DIAMETER OF THE SEWER PIPE, BUT NOT LESS THAN 4" OR MORE THAN 6" BEDDING SHALL EXTEND TO THE SPRING LINE OF THE PIPE IN ALL CASES UNLESS INDICATED OTHERWISE ON THE PLANS. FOR PVC SANITARY SEWER, THE BEDDING SHALL EXTEND TO ONE FOOT ABOVE TOP OF THE PIPE AND CONFORM TO ASTM C-33 FOR SOUNDNESS AND ASTM C-67 FOR GRADATION. COST FOR BEDDING SHALL BE MERGED WITH THE UNIT PRICE BID FOR THE SEWER, WATER MAIN, ETC.
- WATER MAIN FITTINGS MAY OR MAY NOT BE SPECIFICALLY REFERENCED ON THE CONSTRUCTION PLANS, HOWEVER THEY ARE TO BE CONSIDERED AS INCIDENTAL AND INCLUDED IN THE LINEAL FOOTAGE COST OF THE WATER MAIN.
- ALL WATER MAIN SHALL BE WRAPPED WITH A POLYWRAP WITH A MINIMUM THICKNESS OF 8mm. IT SHALL BE A POLYETHYLENE TUBE SUCH AS CLOW TYPE F-191 OR EQUAL AND SHALL COMPLETELY ENCASE AND SEAL THE WATER MAIN AND FITTINGS AND ACCESSORIES IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS FOR THE USE OF THE ENCASEMENT TUBE.
- GATE VALVES IN ACCORDANCE WITH CITY STANDARDS SHALL BE USED WHEREVER VALVES ARE CALLED FOR. VALVES SHALL BE MUELLER 2360-23-9020 RESILIENT SEAT TYPE CONFORMING TO ANWA C-509. ALL VALVES SHALL BE RATED FOR 400 PSI TEST PRESSURE AND 200 PSI WORKING PRESSURE.
- VALVE VAULTS SHALL BE USED AT ALL VALVE LOCATIONS. VAULTS SHALL BE PRECAST CONCRETE STRUCTURES, WITH APPROPRIATE FRAME AND LIDS (SEE CONSTRUCTION STANDARDS SHEET). LIDS SHALL BE IMPRINTED "WATER" AND "CITY OF CRYSTAL LAKE".
- HYDRANTS SHALL BE MUELLER CENTURION OPT-094, WITH 2 PUMPER NOZZLES PAINTED WITH RUST-OLEUM FIRE HYDRANT ENAMEL RED AND EQUIPPED WITH 5-1/4 INCH VALVE OPENINGS IN ACCORDANCE WITH THE CITY'S STANDARDS. ALL HYDRANTS SHALL OPEN COUNTERCLOCKWISE AND BE SET A MINIMUM OF 2.5' FROM BACK OF CURB.
- WATER SERVICES SHALL BE LAID NOT LESS THAN 6.0 FT BELOW GRADE. WATER SERVICE LINE SHALL BE IN A SEPARATE TRENCH 10 FT FROM THE SANITARY SEWER SERVICE LINE OR IN THE SAME TRENCH BUT ON A SHELVE 18" ABOVE THE SEWER LINE, IN WHICH CASE THE SEWER PIPE SHALL BE DUCTILE IRON OR C900 PVC DR25 PRESSURE CLASS 100 WATERMAIN QUALITY PIPE.

35. AFTER INSTALLATION, ALL WATERMANS NEED TO BE FLUSHED BASED ON THE FOLLOWING FLOWS:

Pipe Diameter (in.)	Flow Rate (gpm)
4	390
6	880
8	1690
10	2440
12	3500

36. THE CITY SPECIFICATIONS FOR WATER MAIN AND SANITARY SEWER WILL OVERRIDE ANY OTHER CONFLICTING SPECIFICATIONS.

**PAVING, CURB & WALKS**

- WORK UNDER THIS SECTION SHALL INCLUDE FINAL SUBGRADE SHAPING AND PREPARATION: FORMING, JOINTING, PLACEMENT OF ROADWAY AND PAVEMENT BASE COURSE MATERIALS AND SUBSEQUENT BINDER AND/OR SURFACE COURSES; PLACEMENT, FINISHING AND CURING OF CONCRETE; FINAL CLEAN-UP; AND ALL RELATED WORK.
- ALL PAVING, SIDEWALK, AND CURB AND GUTTER WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS (IDOT) AND PER THE CITY OF CRYSTAL LAKE CONSTRUCTION STANDARD DETAILS.
- THE PROPOSED PAVEMENT SHALL CONSIST OF THE SUB-BASE COURSE, BITUMINOUS AGGREGATE BASE COURSE, BITUMINOUS BINDER COURSE, AND BITUMINOUS SURFACE COURSE, OF THE THICKNESS AND MATERIALS AS SPECIFIED ON THE CONSTRUCTION PLANS. PRIME COAT SHALL BE APPLIED TO THE SUB-BASE COURSE AT A RATE OF 0.5 GALLONS PER SQUARE YARD. UNLESS SHOWN AS A BID ITEM, PRIME COAT SHALL BE CONSIDERED AS INCIDENTAL TO THE COST OF THE CONTRACT. ALL PAVEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION," 1994 EDITION.
- WHEN PLACING THE BASE MATERIAL BETWEEN CURBS, THE CONTRACTOR SHALL EITHER MARK (WITH PAINT) ON THE FACE OF THE CURB FLAG THE SURFACE LEVEL OF THE BASE MATERIAL AT 50' INTERVALS, OR USE A GUIDE SHOW ON THE GRADER. THE PURPOSE FOR THIS IS TO PROVIDE A CONTROLLABLE GUIDE FOR THE SURFACE ELEVATION OF THE BASE MATERIAL AND TO INSURE SUFFICIENT DEPTH ALONG FACE OF CURB FLAG FOR THE REQUIRED WEARING SURFACE THICKNESS.
- AFTER THE INSTALLATION OF THE BASE COURSE, ALL TRAFFIC AFTER BE KEPT OFF THE BASE UNTIL THE BINDER COURSE IS LAID. AFTER INSTALLATION OF THE BINDER COURSE (AND FOR PUBLIC IMPROVEMENTS AFTER THE BINDER COURSE HAS BEEN IN PLACE FOR ONE WINTER), AND UPON THE COMPLETION OF INSPECTION BY THE SAME AND APPROVAL BY THE CITY AND OWNER, THE PAVEMENT SHALL BE CLEANED, PRIMED AND THE SURFACE COURSE LAID. ALL DAMAGED AREAS IN THE BINDER, BASE OR CURB AND GUTTER SHALL BE REPAIRED TO THE SATISFACTION OF THE CITY AND OWNER, PRIOR TO LAYING THE SURFACE COURSE. THE PAVING CONTRACTOR SHALL PROVIDE WHATEVER EQUIPMENT AND MANPOWER IS NECESSARY, INCLUDING THE USE OF POWER BROOMS TO PREPARE THE PAVEMENT FOR APPLICATION OF THE SURFACE COURSE. EQUIPMENT AND MANPOWER TO CLEAN SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE CONTRACT. PRIME COAT OF THE BINDER COURSE SHALL ALSO BE CONSIDERED AS INCIDENTAL TO THE COST OF THE CONTRACT AND SHALL BE APPLIED TO THE BINDER AT A RATE OF 0.5 GALLONS PER SQUARE YARD.
- COMBINATION CURB AND GUTTER SHALL BE OF THE TYPE AS DETAILED IN THE CONSTRUCTION PLANS. THE CONCRETE SHALL HAVE AN AIR CONTENT OF NOT LESS THAN 5% NOR MORE THAN 7% OF THE VOLUME OF CONCRETE. CONCRETE SHALL DEVELOP A MINIMUM OF 3,500 PSI COMPRESSIVE STRENGTH AT 14 DAYS. ALL CURB AND GUTTER SHALL BE BROOM FINISHED. THE CONTRACTOR IS CAUTIONED TO REFER TO THE CONSTRUCTION STANDARDS AND THE PAVEMENT CROSS SECTIONS DETERMINE THE GUTTER FLAG THICKNESS AND THE AGGREGATE BASE COURSE THICKNESS BENEATH THE CURB AND GUTTER. (THE AGGREGATE BENEATH THE CURB AND GUTTER SHALL BE INCLUDED IN THE UNIT PRICE OF THE CURB AND GUTTER OR THE ROADWAY SUB-BASE AGGREGATE MATERIAL SHALL BE EXTENDED BENEATH THE CURB AND GUTTER AND WILL BE INCLUDED IN THE COST FOR PAVEMENT SUB-BASE).
- 3/4" THICK PREMOULDED FIBRE EXPANSION JOINTS WITH TWO NO. 5 PLAIN ROUND STEEL DOWEL BARS SHALL BE INSTALLED AT 60' INTERVALS AND AT ALL P.C.'S, P.T.'S, CURB RETURNS, AND AT THE END OF EACH POUR. ALTERNATED ENDS OF THE DOWEL BARS SHALL BE GREASED AND FITTED WITH METAL EXPANSION TUBES 3/4" FIBRE EXPANSION JOINTS SHALL BE USED IN EVERY CASE WHERE THE SIDEWALK COINCIDES WITH THE CURB AND GUTTER. SAWED CONTRACTION JOINTS, 3" DEEP, SHALL BE PROVIDED AT 15' (MAXIMUM) INTERVALS IN THE CURB. THE COST OF THESE JOINTS SHALL BE CONSIDERED AS INCIDENTAL TO THE COST OF THE CONTRACT. ALL POURED IN PLACE CONCRETE CURB AND GUTTER SHALL INCORPORATE TWO NO. 5 REINFORCING BARS 10' ALONG INSTALLED WHERE THE CURB AND GUTTER CROSSED UTILITY SERVICE LINES, THE COST WHICH SHALL BE CONSIDERED INCIDENTAL TO THE COST CONCRETE CURB AND GUTTER.
- CURING AND PROTECTION OF ALL EXPOSED CONCRETE SURFACES SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. NO HONEY-COMBING OF THE CURB AND GUTTER WILL BE ACCEPTED.
- BACKFILLING OF CURBS OR PAVEMENT SHALL BE THE RESPONSIBILITY OF THE EARTHWORK CONTRACTOR.
- IT SHALL BE THE RESPONSIBILITY OF THE PAVING CONTRACTOR TO REMOVE FROM THE SITE ANY AND ALL MATERIALS AND DEBRIS WHICH RESULT FROM HIS CONSTRUCTION OPERATIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.

11. TESTING OF THE SUB-BASE, BASE COURSE, BINDER COURSE, SURFACE COURSE AND CONCRETE WORK SHALL BE REQUIRED IN ACCORDANCE WITH THE IDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" LATEST EDITION, AND IN ACCORDANCE WITH THE SPECIFIC REQUIREMENTS OF THE CITY. A QUALIFIED TESTING FIRM SHALL BE EMPLOYED BY THE DEVELOPER TO PERFORM THE REQUIRED TESTS AND PROVIDE THE RESULTS TO THE ENGINEER AND THE CITY.

12. PAINTED PAVEMENT MARKINGS AND SYMBOLS, OF THE TYPE AND COLOR AS NOTED ON THE CONSTRUCTION PLANS, SHALL BE INSTALLED IN ACCORDANCE WITH SECTION T-502 OF SAME SPECIFICATIONS.

13. PAINTED PAVEMENT MARKINGS AND SYMBOLS SHALL BE INSTALLED ONLY WHEN THE AMBIENT AIR TEMPERATURE IS 40 OF AND THE FORECAST CALLS FOR RISING TEMPERATURES.

**VACUUM TESTING OF MANHOLES:**

THIS SPECIFICATION SHALL GOVERN THE VACUUM TESTING OF THE SANITARY SEWER MANHOLES AND STRUCTURES. VACUUM TESTING SHALL BE ACCORDING TO ASTM C1244, EXCEPT AS SPECIFIED OTHERWISE HEREIN. OTHER FORMS OF TESTING OF SOME MANHOLE MAY BE REQUIRED, AS DEEMED NECESSARY BY THE VILLAGE.

MANHOLES SHALL BE TESTED AFTER INSTALLATION WITH ALL CONNECTIONS IN PLACE.

- LIFT HOLES, IF ANY, SHALL BE PLUGGED WITH AN APPROVED, NON-SHRINKABLE GROUT PRIOR TO TESTING.
- DROP CONNECTION SHALL BE INSTALLED PRIOR TO TESTING.
- THE VACUUM TEST SHALL INCLUDE TESTING OF THE SEAL BETWEEN THE CAST IRON FRAME AND THE CONCRETE CONE, SLAB OR GRADE RINGS.
- MANHOLE VACUUM TESTING SHALL BE PERFORMED AFTER ALL ADJACENT UNDERGROUND UTILITIES HAVE BEEN INSTALLED AND ALL MANHOLES HAVE BEEN BACKFILLED AND FINISHED TO FINAL GRADE. UPON REQUEST OF THE CONTRACTOR, MANHOLE VACUUM TESTING MAY BE PERFORMED PRIOR TO INSTALLATION OF ADJACENT UTILITIES, AFTER ALL MANHOLES HAVE BEEN BACKFILLED AND FINISHED TO FINAL GRADE AND AFTER THE SEWER LEAKAGE TESTING HAS BEEN COMPLETED, WITH THE FOLLOWING SPECIAL CONDITIONS: ALL MANHOLES FOUND TO HAVE BEEN DAMAGED OR DISTURBED PRIOR TO FINAL (ONE YEAR) INSPECTION SHALL BE CORRECTED AND VACUUM TESTED AT THAT TIME, REGARDLESS OF WHETHER OR NOT THEY WERE ORIGINALLY VACUUM TESTED.
- IF A COATING OR LINING IS TO BE APPLIED TO THE INTERIOR OF THE MANHOLE, THE VACUUM TEST MUST NOT BE PERFORMED UNTIL THE COATING OR LINING HAS BEEN CURED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
- IF EXISTING MANHOLES ARE TO BE VACUUM TESTED, THE ENGINEER AND CONTRACTOR MUST DEEM THE MANHOLE STRUCTURALLY SOUND PRIOR TO VACUUM TESTING.

PROCEDURE FOR TESTING SHALL BE AS FOLLOWS:

- TEMPORARILY PLUG ALL PIPES ENTERING THE MANHOLE. EACH PLUG MUST BE INSTALLED AT A LOCATION BEYOND THE MANHOLE/PIPE GASKET (I.E. OUTSIDE THE WALL), AND SHALL BE BRACED TO PREVENT THE PLUG OR PIPE FROM BEING DRAWN INTO THE MANHOLE.
- THE TEST HEAD SHALL BE PLACED INSIDE THE RIM OF THE CAST IRON FRAME AT THE TOP OF THE MANHOLE AND INFLATED, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- A VACUUM OF AT LEAST TEN INCHES OF MERCURY (10" Hg) SHALL BE DRAWN ON THE MANHOLE. SHUT THE VALVE ON THE VACUUM LINE TO THE MANHOLE AND SHUT OFF THE PUMP OR DISCONNECT THE VACUUM LINE FROM THE PUMP.
- THE PRESSURE GAGE SHALL BE LIQUID FILLED, HAVING A 3.5 INCH DIAMETER FACE WITH A READING FROM ZERO TO THIRTY INCHES OF MERCURY.
- THE MANHOLE SHALL BE CONSIDERED TO PASS THE VACUUM TEST IF THE VACUUM READING DOES NOT DROP MORE THAN 1" Hg DURING THE FOLLOWING MINIMUM TEST TIMES:

MH DEPTH (FEET)	4' DIAMETER MH	5' DIAMETER MH	6' DIAMETER MH
15 FEET OR LESS	50 SEC.	1 MIN. 5 SEC.	1 MIN. 20 SEC.
15.01 TO 30 FEET	1 MIN. 20 SEC.	1 MIN. 45 SEC.	2 MIN. 10 SEC.

- IF A MANHOLE FAILS THE VACUUM TEST, THE MANHOLE SHALL BE REPAIRED WITH A NON-SHRINKABLE GROUT OR OTHER MATERIAL OR METHOD APPROVED BY THE ENGINEER. THE MANHOLE SURFACES SHALL BE PROPERLY PREPARED PRIOR TO ANY REPAIRS. ONCE THE REPAIR MATERIAL HAS CURED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS THE VACUUM TEST SHALL BE REPEATED. THIS PROCESS SHALL CONTINUE UNTIL A SATISFACTORY TEST IS OBTAINED.
- ALL TEMPORARY PLUGS AND BRACES SHALL BE REMOVED AFTER EACH TEST.

No.	Description	Date
3	CITY COMMENTS	02/01/06
2	CITY COMMENTS	12/07/07
1	CITY COMMENTS	10/25/07
	NO REVISION	09/07/07
	ISSUED FOR PERMIT	09/28/07

**SPECIFICATIONS**  
**AL & JOE'S RESTAURANT**  
**PARTNERS IN DESIGN**  
**CRYSTAL LAKE, IL**

**JACOB & HEFNER ASSOCIATES, INC.**  
**ENGINEERS • SURVEYORS**  
 1901 S. MEYERS ROAD, SUITE 360  
 OAKBROOK TERRACE, IL 60161  
 PHONE: (630) 652-4500  
 FAX: (630) 652-4601

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