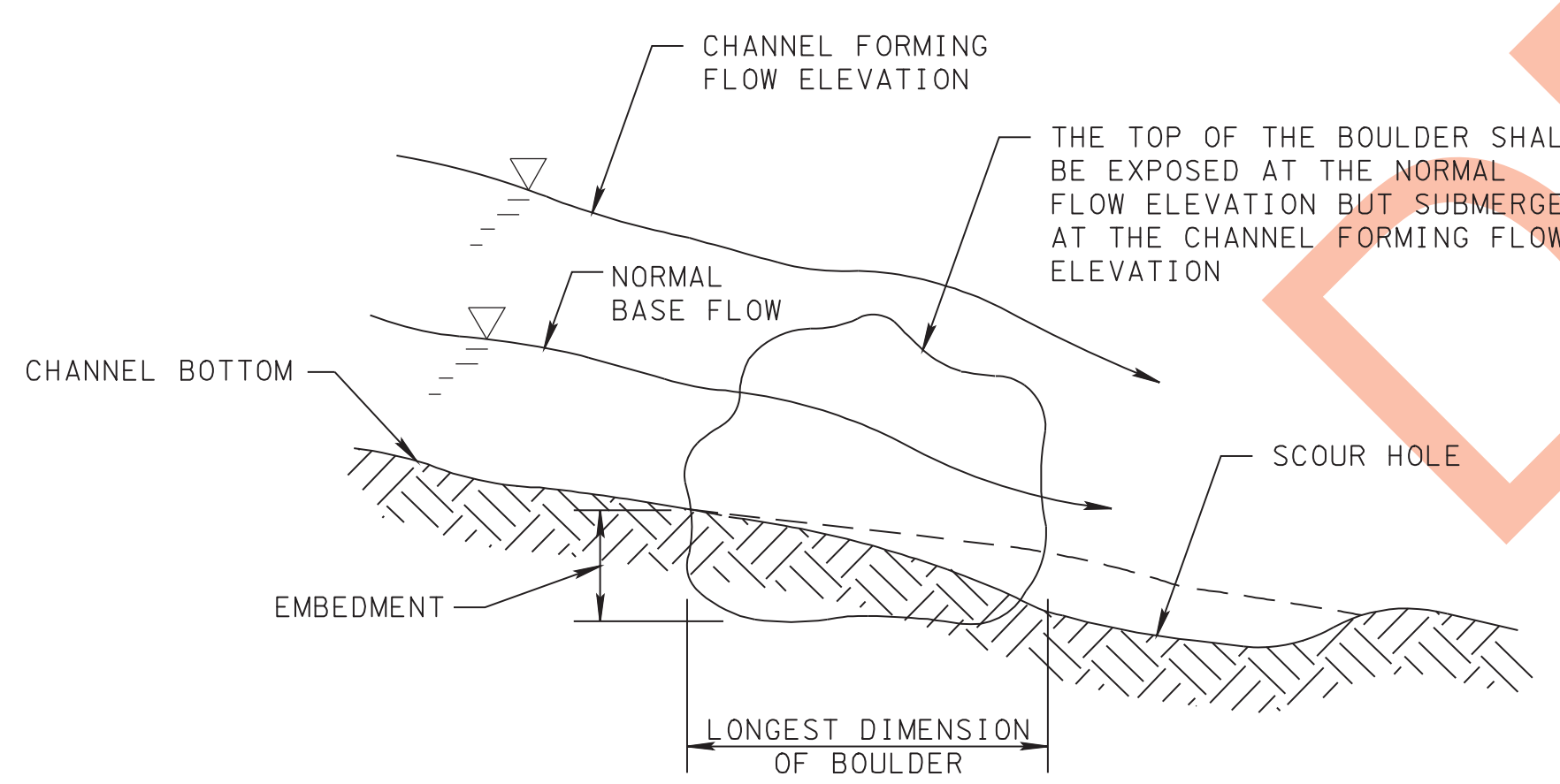


NOTE ①: PAY ITEM LIMITS FOR EACH CLUSTER TYPE

**PLAN VIEW
BOULDER CLUSTER CONFIGURATIONS**



SECTION A-A

BOULDER CLUSTERS GENERAL NOTES

(A) BOULDER CLUSTERS ARE HYDRAULIC CONTROL MEASURES CONSISTING OF A GROUP OF ONE OR MORE LARGE IMMOBILE ROCKS STRATEGICALLY ARRANGED IN A STREAM. THEY SHOULD BE USED TO DUPLICATE BOULDERS WHICH MAY BE PRESENT IN A STREAM TO BE RELOCATED.

(B) PLACE CLUSTERS AT THE STATIONS AND OFFSETS INDICATED ON THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS. PLACE BOULDERS IN THE CONFIGURATIONS SHOWN ON THE STREAM MITIGATION PLAN SHEET TO CREATE A MEANDERING FLOW PATH FOR LOW FLOWS OR AS DIRECTED BY THE ENGINEER. BOULDERS SHOULD NOT BE PLACED IN AREAS SUBJECT TO DEPOSITION OF SEDIMENT.

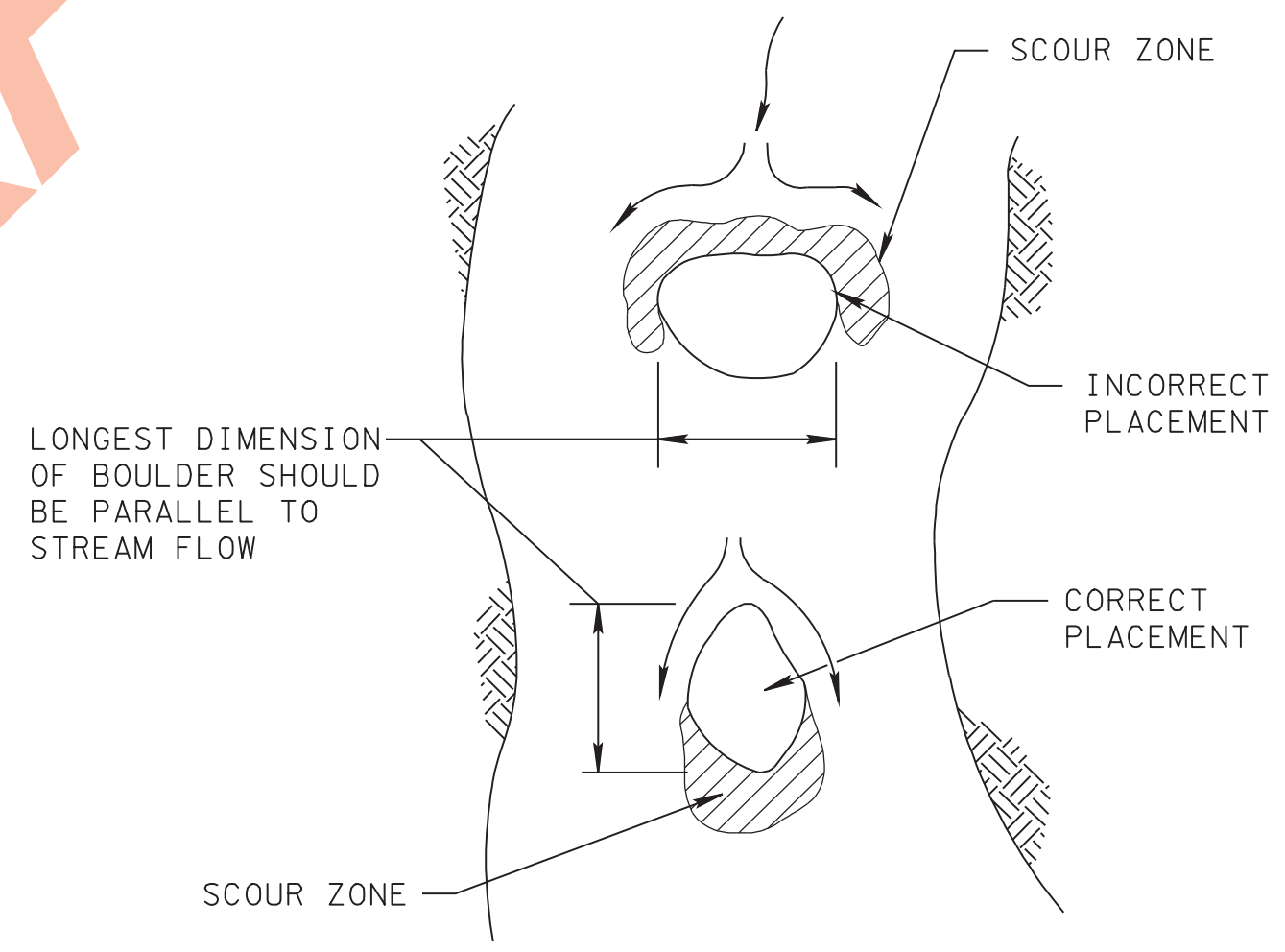
(C) BOULDERS SHOULD BE PLACED SUCH THAT THE SCOUR CREATED BY ONE BOULDER WILL NOT OVERLAP THE LOCATION OF ANOTHER BOULDER CLUSTER. IN FAST MOVING STREAMS, THE SCOUR ZONE WILL TEND TO OCCUR ALONG THE SIDES AND DOWNSTREAM OF THE BOULDER CLUSTER. IN SLOWER MOVING STREAMS, THE SCOUR ZONE WILL TEND TO FORM UPSTREAM OF THE BOULDER CLUSTER. TO DISCOURAGE UPSTREAM SCOUR, THE LONGEST DIMENSION OF THE BOULDER SHOULD BE ALIGNED WITH THE STREAM FLOW.

(D) BOULDER CLUSTERS SHOULD BE PLACED IN STREAMS WHERE THE CHANNEL MATERIALS CONSIST OF A COMBINATION OF GRAVEL AND COBBLES AND THE AVERAGE FLOW VELOCITY IS AT LEAST 2 FEET PER SECOND. THEY SHOULD NOT BE APPLIED IN SANDY STREAMS, WHERE SCOUR COULD LEAD TO THE FAILURE OF THE MEASURE.

(E) BOULDER CLUSTERS SHOULD NOT BE UTILIZED IN LOCATIONS THAT EXPERIENCE HEAVY LOADS OF DEBRIS OR SEDIMENT TRANSPORT.

(F) BOULDERS SHALL BE OF THE SIZE INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. IN SMALL CHANNELS, THE MINIMUM HORIZONTAL DIMENSION PERPENDICULAR TO THE FLOW MAY RANGE FROM 9 INCHES TO 20% OF THE CHANNEL WIDTH (UP TO 30% IS ALLOWABLE IN SMALL STREAMS WITH STEEP SLOPES). IN LARGER CHANNELS, THE BOULDER SIZE MAY VARY FROM 12 INCHES TO 20% OF THE CHANNEL WIDTH. WHERE POSSIBLE, BOULDERS PRESENT IN THE EXISTING STREAM SHOULD BE USED IN THE RELOCATED CHANNEL SEGMENT.

(G) BOULDER CLUSTERS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:
209-03.32 STREAM MITIGATION - BOULDER CLUSTERS PER EACH
PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF EACH BOULDER CLUSTER.



CORRECT BOULDER PLACEMENT