CLAIMS:

1. A method of video decoding for a decoder, the method comprising:

acquiring transform block signaling information from a coded video bitstream;

determining whether (i) the transform block signaling information indicates an implicit transform scheme, and (ii) at least one of a low-frequency non-separable transform (LFNST) and a matrix-based intra predication mode (MIP) is invalid; and

in response to the determination that the transform block signaling information indicates the implicit transform scheme, and at least one of the LFNST and MIP is signaled as invalid,

(i) determining a primary transform type based on a size of a coding block unit (CU), and

(ii) performing a primary transform for a transform block that is partitioned from the CU in accordance with the determined primary transform type.

2. The method of claim 1, wherein determining the primary transform type comprises:

determining whether a transform skip mode is enabled; and

in response to the determination that the transform skip mode is not enabled,

(i) determining a transform type DST-7 for a horizontal transform for the transform block, responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determining a transform type DCT-2 for the horizontal transform for the transform block, responsive to the width of the CU being less than T1 or greater than T2;

(iii) determining a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determining a transform type DCT-2 for the vertical transform for the transform block responsive to the height of the CU being less than T1 or greater than T2.

3. The method of claim 2, wherein the T1 is equal to one of 2 pixels, 4 pixels, or 8 pixels, and T2 is equal to one of 4 pixels, 8 pixels, 16 pixels, or 32 pixels.

4. The method of claim 1, wherein in response to the determination that the transform block signaling information indicates the implicit transform scheme, and the at least one of the LFNST or MIP is signaled as true, the method comprises at least one of:

(i) determining a first transform type DCT-2 for the transform block; and

(ii) determining a second transform type that is not DCT-7 for the transform block, the second transform type including at least one of DST-1, DCT-5, compound orthonormal transform (COT), or karhunen-loève transform.

5. The method of claim 1, wherein in response to the determination that the transform block signaling information indicates the implicit transform scheme, and the MIP is signaled as false which indicates the MIP is not applied for the transform block, the method comprises at least one of:

(i) determining a transform type DST-7 for a horizontal transform for the transform block responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determining a transform type DCT-2 for the horizontal transform for the transform block responsive to the width of the CU being less than T1 or greater than T2;

(iii) determining a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determining a transform type DCT-2 for the vertical transform for the transform block responsive to the height of the CU being less than T1 or greater than T2.

6. The method of claim 5, wherein the T1 and T2 indicate at least one of:

T1 is equal to 2 pixels, and T2 is equal to one of 4 pixels or 8 pixels;

T1 is equal to 4 pixels, and T2 is equal to one of 4 pixels or 8 pixels;

T1 is equal to 8 pixels, and T2 is equal to one of 8 pixels, 16 pixels, or 32 pixels; and

T1 is equal to 16 pixels, and T2 is equal to one of 16 pixels or 32 pixels.

7. The method of claim 1, in response to the determination that that the transform block signaling information indicates the implicit transform scheme, and both the LFNST and the MIP are signaled as false which indicates neither the LFNST or the MIP is applied for the transform block, the method comprises at least one of:

(i) determining a transform type DST-7 for a horizontal transform for the transform block responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determining a transform type DCT-2 for the horizontal transform for the transform block responsive to the width of the CU being less than T1 or greater than T2;

(iii) determining a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determining a transform type DCT-2 for the vertical transform of the transform block responsive to the height of the CU being less than T1 or greater than T2.

8. A method of video decoding for a decoder, the method comprising:

acquiring a transform block signaling information from a coded video bitstream;

determining a primary transform type from a plurality of transform types based on the transformation block signaling information and a size of a coding block unit (CU); and

performing a primary transform for a transform block that is partitioned from the CU in accordance with the determined primary transform type, wherein:

the primary transform type is determined as a first primary transform type in response to the size of the CU being in a first range,

the primary transform type is determined based on a signaled index from the transform block signaling information in response to the size of the CU being in a second range, and

the primary transform type is determined as a second primary transform type in response to the size of the CU being in a third range.

9. The method of claim 8, wherein the determining comprises at least one of:

(i) determining that the primary transform type is the first primary transform type of DST-7 for a horizontal transform for the transform block responsive to the size of the CU being in the first range indicates a width of the CU is equal to or greater than T1 and equal to or less than T2;

(ii) determining that the primary transform type is one of DCT-2 or DST-7 based on a signaled index for the horizontal transform of the transform block, responsive to the size of the CU being in the second range that indicates the width of the CU is greater than T2 and equal to or less than T3; and

(iii) determining that the primary transform type is the second primary transform type of DCT-2 for the horizontal transform for the transform block responsive to the size of the CU being in the third range insicates that the width of the CU being less than T1 or greater than T3.

10. The method of claim 9, wherein the determining comprises at least one of:

(i) determining that the primary transform type is the first primary transform type of DST-7 for a vertical transform for the transform block responsive to the size of the CU being in the first range that indicates a height of the CU is equal to or greater than T1 and equal to or less than T2;

(ii) determining that the primary transform type is one of DCT-2 or DST-7 based on the signaled index for the vertical transform for the transform block responsive to the size of the CU being in the second range that indicates the height of the CU is greater than T2 and equal to or less than T3; and

(iii) determining that the primary transform type is the second primary transform type of DCT-2 for the vertical transform for the transform block responsive to the size of the CU being in the third range that indicates the height of the CU is less than T1 or greater than T3.

11. The method of claim 10, wherein the T1 is equal to one of 2 pixels, 4 pixels, or 8 pixels, the T2 is equal to one of 4 pixels, 8 pixels, 16 pixels, or 32 pixels, and the T3 is equal to one of 8 pixels, 16 pixels, 32 pixels, or 64 pixels.

12. An apparatus for video decoding, comprising:

processing circuitry configured to:

acquire transform block signaling information from a coded video bitstream;

determine whether (i) the transform block signaling information indicates an implicit transform scheme, and (ii) at least one of a low-frequency non-separable transform (LFNST) and a matrix-based intra predication mode (MIP) is invalid; and

in response to the determination that the transform block signaling information indicates the implicit transform scheme, and at least one of the LFNST and MIP is signaled as invalid,

(i) determine a primary transform type based on a size of a coding block unit (CU), and

(ii) perform a primary transform for a transform block that is partitioned from the CU in accordance with the determined primary transform type .

13. The apparatus of claim 12, wherein the processing circuitry is configured to:

determine whether a transform skip mode is enabled; and

in response to the determination that the transform skip mode is not enabled,

(i) determine a transform type DST-7 for a horizontal transform for the transform block responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determine a transform type DCT-2 for the horizontal transform for the transform block responsive to the width of the CU being less than T1 or greater than T2;

(iii) determine a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determine a transform type DCT-2 for the vertical transform for the transform block responsive to the height of the CU being less than T1 or greater than T2.

14. The apparatus of claim 12, wherein in response to the determination that that the transform block signaling information indicates the implicit transform scheme, and the at least one of the LFNST or MIP is signaled as true, the processing circuitry is configured to operate at least one of:

(i) determining a first transform type DCT-2 for the transform block; and

(ii) determining a second transform type that is not DCT-7 for the transform block, the second transform type including at least one of DST-1, DCT-5, compound orthonormal transform (COT), or karhunen-loève transform.

15. The apparatus of claim 12, wherein in response to the determination that the transform block signaling information indicates the implicit transform scheme, and the MIP is signaled as false which indicates the MIP is not applied for the transform block, the processing circuitry is configured to operate at least one of:

(i) determining a transform type DST-7 for a horizontal transform for the transform block responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determining a transform type DCT-2 for the horizontal transform for the transform block responsive to the width of the CU being less than T1 or greater than T2;

(iii) determining a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determining a transform type DCT-2 for the vertical transform for the transform block responsive to the height of the CU being less than T1 or greater than T2.

16. The apparatus of claim 15, wherein the T1 and T2 indicate at least one of:

T1 is equal to 2 pixels, and T2 is equal to one of 4 pixels or 8 pixels;

T1 is equal to 4 pixels, and T2 is equal to one of 4 pixels or 8 pixels;

T1 is equal to 8 pixels, and T2 is equal to one of 8 pixels, 16 pixels, or 32 pixels; and

T1 is equal to 16 pixels, and T2 is equal to one of 16 pixels or 32 pixels.

17. The apparatus of claim 12, in response to the determination that that the transform block signaling information indicates the implicit transform scheme, and both the LFNST and the MIP are signaled as false which indicates neither the LFNST or the MIP is applied for the transform block, the processing circuitry is configured to operate at least one of:

(i) determining a transform type DST-7 for a horizontal transform for the transform block responsive to a width of the CU being equal to or greater than T1 and equal to or less than T2;

(ii) determining a transform type DCT-2 for the horizontal transform for the transform block responsive to the width of the CU being less than T1 or greater than T2;

(iii) determining a transform type DST-7 for a vertical transform for the transform block responsive to a height of the CU being equal to or greater than T1 and equal to or less than T2; and

(iv) determining a transform type DCT-2 for the vertical transform of the transform block responsive to the height of the CU being less than T1 or greater than T2.

18. An apparatus for video decoding, comprising:

processing circuitry configured to:

acquire a transform block signaling information from a coded video bitstream;

determine a primary transform type from a plurality of transform types based on the transformation block signaling information and a size of a coding block unit (CU); and

perform a primary transform for a transform block that is partitioned from the CU in accordance with the determined primary transform type, wherein:

the primary transform type is determined as a first primary transform type in response to the size of the CU being in a first range,

the primary transform type is determined based on a signaled index from the transform block signaling information in response to the size of the CU being in a second range, and

the primary transform type is determined as a second primary transform type in response to the size of the CU being in a third range.

19. The apparatus of claim 18, the processing circuitry is further configured to:

(i) determine that the primary transform type is the first primary transform type of DST-7 for a horizontal transform for the transform block responsive to the size of the CU being in the first range that indicates a width of the CU is equal to or greater than T1 and equal to or less than T2;

(ii) determine that the primary transform type is one of DCT-2 or DST-7 based on the signaled index for the horizontal transform of the transform block, responsive to the size of the CU being in the second range that indicates the width of the CU is greater than T2 and equal to or less than T3; and

(iii) determine that the primary transform type is the second primary transform type of DCT-2 for the horizontal transform for the transform block responsive to the size of the CU being in the third range that indicates the width of the CU is less than T1 or greater than T3.

20. The apparatus of claim 19, wherein the processing circuitry is further configured to operate at least one of:

(i) determining that the primary transform type is the first primary transform type of DST-7 for a vertical transform for the transform block responsive to the size of the CU being in the first range that indicates a height of the CU is equal to or greater than T1 and equal to or less than T2;

(ii) determining that the primary transform type is one of DCT-2 or DST-7 based on the signaled index for the vertical transform for the transform block responsive to the size of the CU

being in the second range that indicates the height of the CU is greater than T2 and equal to or less than T3; and

(iii) determining that the primary transform type is the second primary transform type of DCT-2 for the vertical transform for the transform block responsive to the size of the CU being in the third range that indicates the height of the CU is less than T1 or greater than T3.