$$\frac{s \text{ is a } \langle string \rangle \text{ token}}{\Gamma \vdash s : \texttt{String}} \quad (\text{STRINGCONST})$$

$$\frac{\tau \in \text{inst}(\Gamma(s))}{\Gamma \vdash s : \tau} \quad (\text{INST})$$

$$\frac{\Gamma \vdash s : \texttt{Stream } \tau}{\Gamma \vdash \texttt{Arg } s : \texttt{Arg}} \quad (\text{ARG})$$

$$\frac{\Gamma \vdash x : \tau}{\Gamma \vdash \texttt{constant } x : \texttt{Stream } \tau} \quad (\text{VALCONST})$$

$$\frac{\Gamma \vdash i : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{Stream } \tau}{\Gamma \vdash \texttt{drop } i \ x : \texttt{Stream } \tau} \quad (\text{DROP})$$

$$\frac{\Gamma \vdash ls : [a] \qquad \Gamma \vdash s : \text{Spec } a}{\Gamma \vdash ls \mathbin{+}\mathbin{+} s : \text{Spec } a} \quad (\text{APPEND})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream } \tau}{\Gamma \vdash \texttt{label } s \ x : \texttt{Stream } \tau} \quad (\text{LABEL})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream } \tau}{\Gamma \vdash \texttt{extern } s \ x : \texttt{Stream } \tau} \quad (\text{EXT})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Bool}}{\Gamma \vdash \texttt{externB } s \ x : \texttt{Stream Bool}} \quad (\text{EXTB})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Int8}}{\Gamma \vdash \texttt{externI8 } s \ x : \texttt{Stream Int8}} \quad (\text{EXTI8})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Int16}}{\Gamma \vdash \texttt{externI16 } s \ x : \texttt{Stream Int16}} \quad (\text{EXTI16})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Int32}}{\Gamma \vdash \texttt{externI32 } s \ x : \texttt{Stream Int32}} \quad (\text{EXTI32})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Int64}}{\Gamma \vdash \texttt{externI64 } s \ x : \texttt{Stream Int64}} \quad (\text{EXTI64})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Word8}}{\Gamma \vdash \texttt{externW8}\ s\ x : \texttt{Stream Word8}} \ (\textsc{extW8})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Word16}}{\Gamma \vdash \texttt{externW16}\ s\ x : \texttt{Stream Word16}} \ (\textsc{extW16})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Word32}}{\Gamma \vdash \texttt{externW32}\ s\ x : \texttt{Stream Word32}} \ (\textsc{extW32})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Word64}}{\Gamma \vdash \texttt{externW64}\ s\ x : \texttt{Stream Word64}} \ (\textsc{extW64})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Float}}{\Gamma \vdash \texttt{externF}\ s\ x : \texttt{Stream Float}} \ (\textsc{extFloat})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash x : \texttt{Stream Double}}{\Gamma \vdash \texttt{externD}\ s\ x : \texttt{Stream Double}} \ (\textsc{extDouble})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash a : \texttt{[Arg]} \qquad \Gamma \vdash x : \texttt{Stream}\ \tau}{\Gamma \vdash \texttt{externFun}\ s\ a\ x : \texttt{Stream}\ \tau} \ (\textsc{extFun})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral}\ \tau_1 \Rightarrow \texttt{Stream}\ \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[}\tau\texttt{]]}}{\Gamma \vdash \texttt{externArray}\ s\ i\ m\ x : \texttt{Stream}\ \tau}$$
$$(\textsc{extA})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral}\ \tau_1 \Rightarrow \texttt{Stream}\ \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Bool]]}}{\Gamma \vdash \texttt{externArrayB}\ s\ i\ m\ x : \texttt{Stream Bool}}$$
$$(\textsc{extAB})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral}\ \tau_1 \Rightarrow \texttt{Stream}\ \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Int8]]}}{\Gamma \vdash \texttt{externArrayI8}\ s\ i\ m\ x : \texttt{Stream Int8}}$$
$$(\textsc{extAI8})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral}\ \tau_1 \Rightarrow \texttt{Stream}\ \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Int16]]}}{\Gamma \vdash \texttt{externArrayI16}\ s\ i\ m\ x : \texttt{Stream Int16}}$$
$$(\textsc{extAI16})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral}\ \tau_1 \Rightarrow \texttt{Stream}\ \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Int32]]}}{\Gamma \vdash \texttt{externArrayI32}\ s\ i\ m\ x : \texttt{Stream Int32}}$$
$$(\textsc{extAI32})$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Int64]]}}{\Gamma \vdash \texttt{externArrayI64 } s\ i\ m\ x : \texttt{Stream Int64}} \text{ (EXTAI64)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Word8]]}}{\Gamma \vdash \texttt{externArrayW8 } s\ i\ m\ x : \texttt{Stream Word8}} \text{ (EXTAW8)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Word16]]}}{\Gamma \vdash \texttt{externArrayW16 } s\ i\ m\ x : \texttt{Stream Word16}} \text{ (EXTAW16)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Word32]]}}{\Gamma \vdash \texttt{externArrayW32 } s\ i\ m\ x : \texttt{Stream Word32}} \text{ (EXTAW32)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Word64]]}}{\Gamma \vdash \texttt{externArrayW64 } s\ i\ m\ x : \texttt{Stream Word64}} \text{ (EXTAW64)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Float]]}}{\Gamma \vdash \texttt{externArrayF } s\ i\ m\ x : \texttt{Stream Float}} \text{ (EXTAFLOAT)}$$

$$\frac{\Gamma \vdash s : \texttt{String} \qquad \Gamma \vdash i : \texttt{Integral } \tau_1 \Rightarrow \texttt{Stream } \tau_1 \qquad \Gamma \vdash m : \texttt{Integer} \qquad \Gamma \vdash x : \texttt{[[Double]]}}{\Gamma \vdash \texttt{externArrayD } s\ i\ m\ x : \texttt{Stream Double}} \text{ (EXTADOUBLE)}$$

$$\frac{\Gamma \vdash x : \texttt{Stream Bool} \qquad op \in \{\texttt{not}\}}{\Gamma \vdash op\ x : \texttt{Stream Bool}} \text{ (OP1BOOL)}$$

$$\frac{\Gamma \vdash x : \texttt{Bits } \tau \Rightarrow \texttt{Stream } \tau \qquad op \in \{\texttt{complement}\}}{\Gamma \vdash op\ x : \texttt{Stream } \tau} \text{ (OP1BITWISE)}$$

$$\frac{\Gamma \vdash x : \texttt{Integral } \tau \Rightarrow \texttt{Stream } \tau \qquad op \in \{\texttt{abs}, \texttt{signum}\}}{\Gamma \vdash op\ x : \texttt{Stream } \tau} \text{ (OP1NUM)}$$

$$\frac{\Gamma \vdash x : \texttt{Stream Bool} \qquad \Gamma \vdash y : \texttt{Stream Bool} \qquad op \in \{\texttt{||}, \texttt{\&\&}, \texttt{`xor`}, \texttt{==>}\}}{\Gamma \vdash op\ x\ y : \texttt{Stream Bool}} \text{ (OP2BOOL)}$$

$$\frac{\Gamma \vdash x : \text{Integral } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Integral } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{`mod`}, \text{`div`}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2INTEGRAL})$$

$$\frac{\Gamma \vdash x : \text{Fractionnal } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Fractionnal } \tau \Rightarrow \text{Stream } \tau \quad op \in \{/\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2FRACTIONNAL})$$

$$\frac{\Gamma \vdash x : \text{Floating } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Floating } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{**}, \text{`logBase`}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2FLOATING})$$

$$\frac{\Gamma \vdash x : \text{Num } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Num } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{+}, \text{-}, \text{*}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2NUM})$$

$$\frac{\Gamma \vdash x : \text{Eq } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Eq } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{==}, \text{/=}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2EQ})$$

$$\frac{\Gamma \vdash x : \text{Ord } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Ord } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{<}, \text{<=}, \text{>=}, \text{>}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2ORD})$$

$$\frac{\Gamma \vdash x : \text{Bits } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Bits } \tau \Rightarrow \text{Stream } \tau \quad op \in \{\text{.\&.}, \text{.|.}, \text{.\^{}.}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2BITWISE})$$

$$\frac{\Gamma \vdash x : \text{Bits } \tau \Rightarrow \text{Stream } \tau \quad \Gamma \vdash y : \text{Integral } \tau_1 \Rightarrow \text{Stream } \tau_1 \quad op \in \{\text{.>>.}, \text{.<<.}\}}{\Gamma \vdash op \; x \; y : \text{Stream } \tau}$$
$$(\text{OP2BWSHIFT})$$

$$\frac{\Gamma \vdash x : \text{Stream Bool} \quad \Gamma \vdash y : \text{Stream } \tau \quad \Gamma \vdash z : \text{Stream } \tau \quad op \in \{\text{mux}\}}{\Gamma \vdash op \; x \; y \; z : \text{Stream } \tau}$$
$$(\text{OP3})$$